JUNE, 1925

Railway Engineering and Maintenance

Why Tolerate Weeds?

"Herbicide"

Costs only $25.00 to $50.00 per mile a year.

Destroys vegetation for the growing season. Three men and a crew can weed 50 to 100 miles of track a day.

Relieves labor for other important work.

Hand Weeding

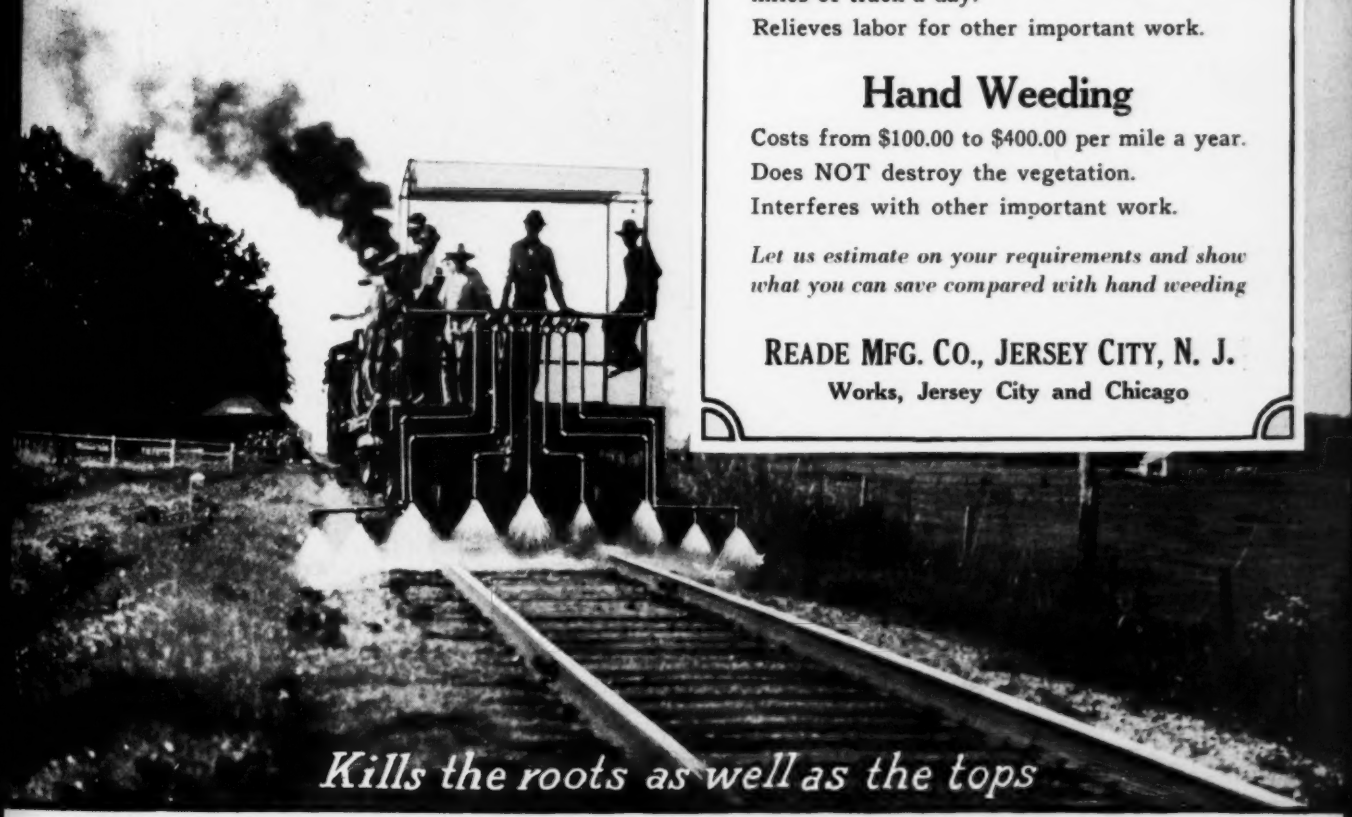
Costs from $100.00 to $400.00 per mile a year.

Does NOT destroy the vegetation.

Interferes with other important work.

Let us estimate on your requirements and show what you can save compared with hand weeding

READE MFG. CO., JERSEY CITY, N. J.
Works, Jersey City and Chicago



Kills the roots as well as the tops

"HERBICIDE"

The Weed Exterminator

HY-CROME

MEANS rail joint rigidity that never relaxes. This unfailing performance, over longer periods at lower cost, is the result of that excess fatigue defying, gripping power, natural to Hy-Crome. An inbuilt quality never duplicated by ordinary nut locks.

THE RELIANCE MFG. CO.

MASSILLON, OHIO

ST. LOUIS SAN FRANCISCO
NEW YORK CLEVELAND DETROIT CHICAGO

Montreal, Quebec, Canada, McGill Bldg., Engineering Materials, Ltd.
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A Complete Line of Motor Cars

Water-Cooled and Air-Cooled

THE knowledge gained in seventeen years of railroad motor car building has shown that no single type of car can possibly cover, to the highest point of efficiency, all the requirements of a railroad. That's why the Mudge line is complete—eight distinct models are available, side drive or center load, free running or direct connected, air or water-cooled motors—and makes it possible for you to choose a car that will meet your special requirements.

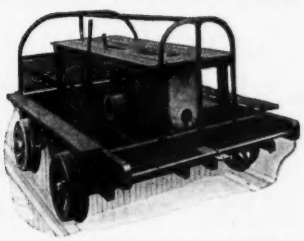
Backed by Seventeen Years' Experience

Mudge cars are backed by a competent field service organization constantly at the command of the railroads and every car and its component parts carries the liberal Mudge guarantee.

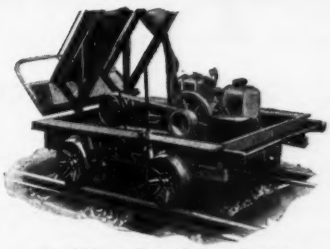
Whatever your requirements may be you can select a Mudge car with absolute assurance it will economically fit your conditions of service.

Mudge & Company

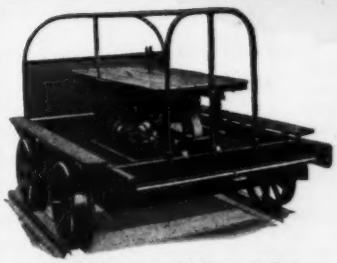
Manufacturers—Railroad Equipment
Railway Exchange Bldg. - CHICAGO



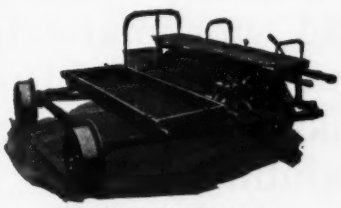
The "All-Service" Class W S-2



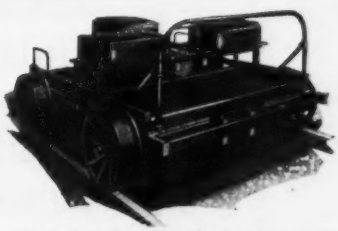
The "Heavy Duty" Class W S-3



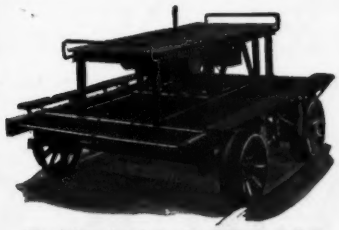
The "Wonderpull" Class G S-4



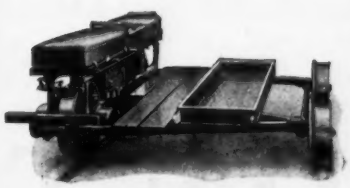
The "Special" Class E-11



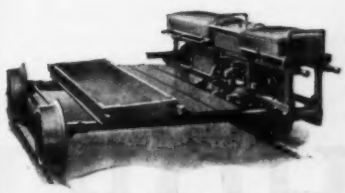
The "Safety First Roadster" Class E-60



The "Standard Section" Class E S-3



The "Hill Climber" Class E-4



The "Power Queen" Class G 2

Steel

THE steel tank costs less in the end than any other. It has the most economical combination of first cost and length of life.

You and other officials are relieved of responsibility wherever you have a steel tank. The manufacturer is responsible for materials and workmanship during construction—and there is no maintenance expense except occasional painting.

Steel tanks are tanks you can depend on

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HORTON STEEL WORKS, LTD., Bridgeburg, Ont.; Montreal; Toronto; Winnipeg

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HORTON TANKS

The Engine Terminal of the Chicago & Eastern Illinois at West Frankfort, Ill., After the Tornado

Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

Vol. 21 June, 1925 Number 6

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WOULD YOU LIKE TO KNOW

Why rail joints interfere with spike driving?
How to prevent sand from drifting over tracks?
A common cause of "shorts" in the ignition system of motor cars?
A new way of cleaning ballast?
How to reduce the fire hazard in lighting tunnels for repair work?

Answers to these and other questions will be found in this issue.

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THE ANDERSON Switch INTERLOCKER

Absolute Switch Safety

The ANDERSON Switch INTERLOCKER protects against unavoidable conditions such as damaged or defective equipment, worn parts giving way, etc.; against the failure of the human element—carelessness—as the switch **cannot be locked** unless properly closed.

1. The ANDERSON Switch INTERLOCKER protects the switch points from opening under traffic should the switch stand be damaged or destroyed by accident. It is not a part of the switch stand.
2. It safeguards train operation against accidents due to:
   Loose bolts, nuts or other obstructions between the switch point and the rail.
   Switch stands disabled by,
   Loose lumber or pipe on loaded car,
   Loose doors on box cars,
   Being struck by mail pouch, etc.
3. It prevents the switch points from opening under traffic should any part of the switch mechanism become disengaged or fail when the switch is closed and locked for the main line.
4. The switch points must be properly closed in order to apply the padlock.
5. The interlocking is automatic when the switch is properly closed.
6. Can be applied to ANY switch and used with ANY switch stand.

Write for complete literature.

Manufactured exclusively by

The American Valve and Meter Co.

CINCINNATI, OHIO, U. S. A.

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St. Louis, Mo., Chemical Bldg. Baltimore, Md., 724 E. Pratt St.
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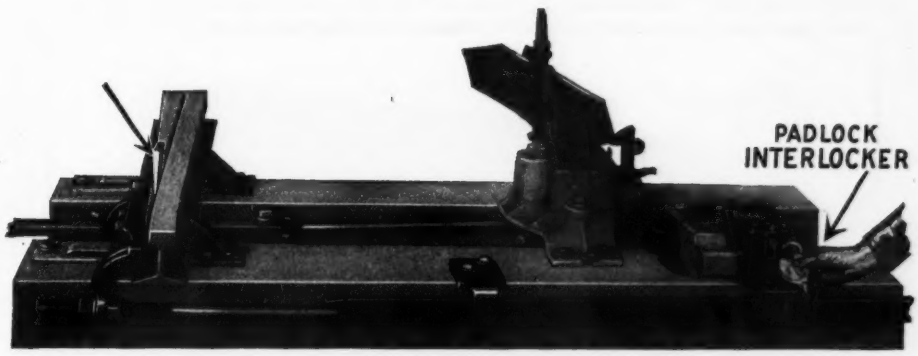
Sole Canadian Representatives

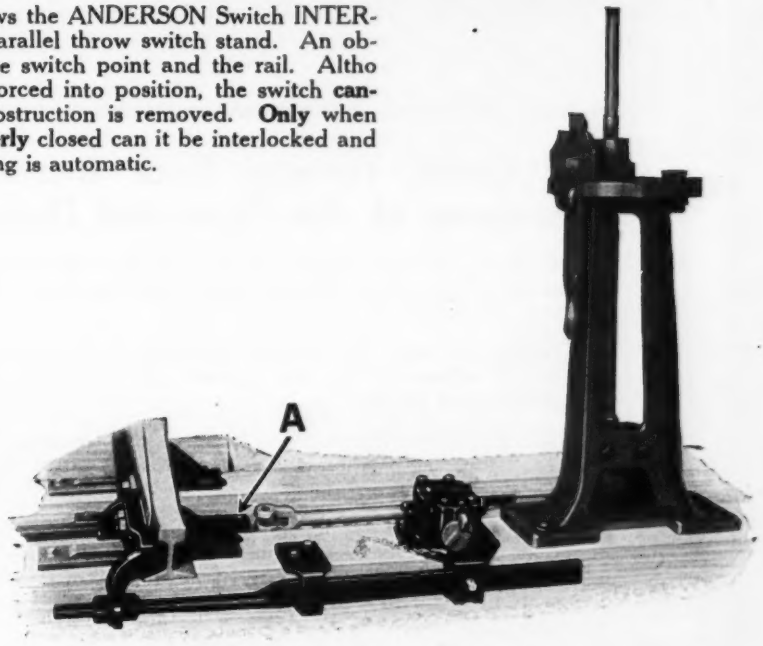
The General Supply Company of Canada, Ltd.

Ottawa Toronto Montreal Moncton

Can be used with ANY Switch Stand

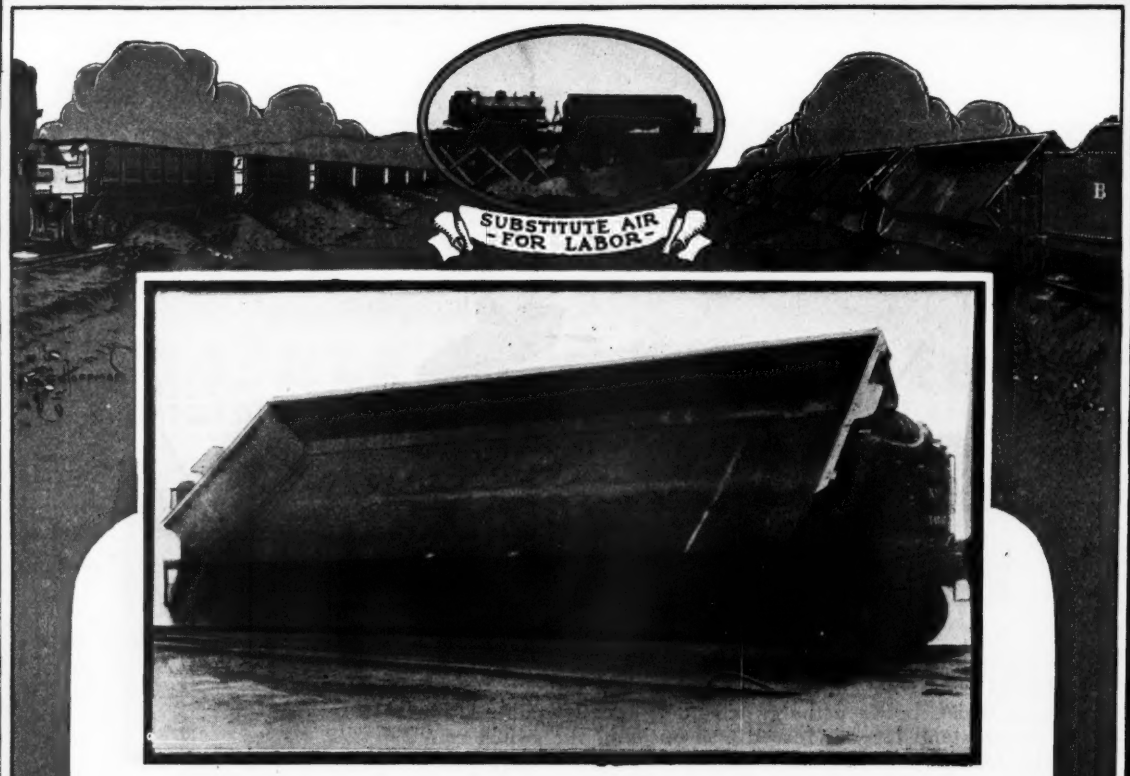


The illustration above shows the ANDERSON Switch INTERLOCKER used with the Parallel throw switch stand. An obstruction exists between the switch point and the rail. Altho the switch stand lever is forced into position, the switch **cannot be locked** until the obstruction is removed. **Only** when the switch points are **properly** closed can it be interlocked and padlocked. The interlocking is automatic.



In the illustration above, the switch is closed and locked but the head rod bolt at A is missing. Ordinarily this would leave the switch unprotected but with the ANDERSON Switch INTERLOCKER, it is held absolutely safe for traffic. **It is interlocked.**

The American Valve & Meter Co. CINCINNATI, OHIO, U. S. A.



The Down Turning Door Increases the Usefulness of Air Operated Dump Cars

THE Extension Side Dump Car has all the advantages of the air operated Dump Cars plus the unique and important advantages of the down turning door.

This feature has more than passing significance—it is extremely important for all railroad service and is practically a necessity for handling big boulders and the like.

Examine the above illustration. It shows the Extension Side Dump Car in full dumping position with particular emphasis on the down turning door.

It is quite evident there is absolutely nothing to hinder, retard or cause materials to wedge while dumping. The down turning door makes possible the free dumping of materials regardless of their size, thereby increasing the usefulness of this equipment.

Write for leaflet No. 15

CLARK CAR COMPANY

PITTSBURGH, PA.

New York Office
52 Vanderbilt Ave.

Chicago Office
122 South Michigan Ave.

Extension Side Dump Cars

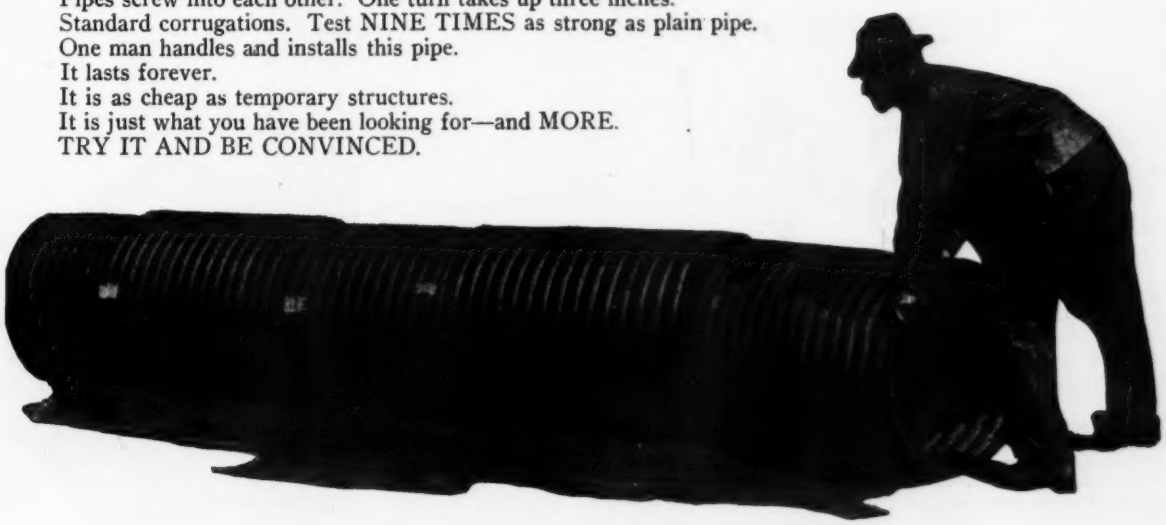
— Air Operated —

Introducing "THE MISSING LINK"

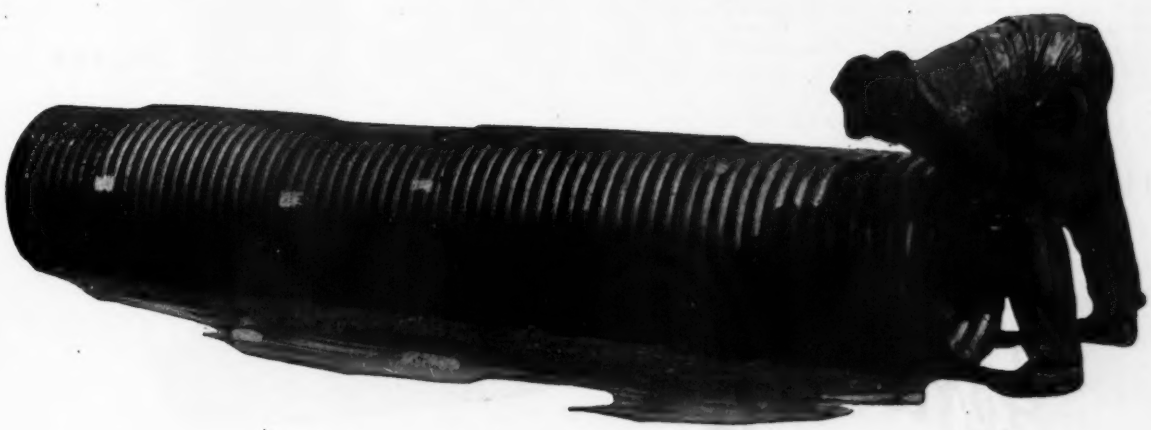
SPIRAL CORRUGATED CAST IRON CULVERT PIPE

Snappy Facts About It

Solid, round, vertically cast, pure remelted pig iron. *No scrap.*
Lengths of three feet, three inches.
Pipes screw into each other. One turn takes up three inches.
Standard corrugations. Test NINE TIMES as strong as plain pipe.
One man handles and installs this pipe.
It lasts forever.
It is as cheap as temporary structures.
It is just what you have been looking for—and MORE.
TRY IT AND BE CONVINCED.



Entering the Pipe by Rolling in on an Angle.



Screwing Pipe Together. One Turn Takes Up Three Inches

WE HAVE BEEN MAKING CAST IRON CULVERT PIPE FOR TWENTY YEARS

Write for Details and Prices

American Casting Company

Box 591 BIRMINGHAM, ALA.

No *"fingering down"*— No *accidents*

A new trip jack which can be lowered automatically, therefore *absolutely*

Safe!

"Give us a track jack which eliminates accidents in 'fingering down'!" So many railroad men told us the same thing that we decided to go into the problem in dead earnest.

Of course, combination track and automatic lowering jacks have existed for many years, but they have lacked the rugged simplicity required for track work, and therefore have never found favor among track men.

After several years of work and experiment, we developed the No. 110. Before offering this jack to you, it was tested for nearly one year in actual service on several railroads. The results exceeded all expectations. Railroad men pronounced it the best track jack they had ever used—**and the safest.**

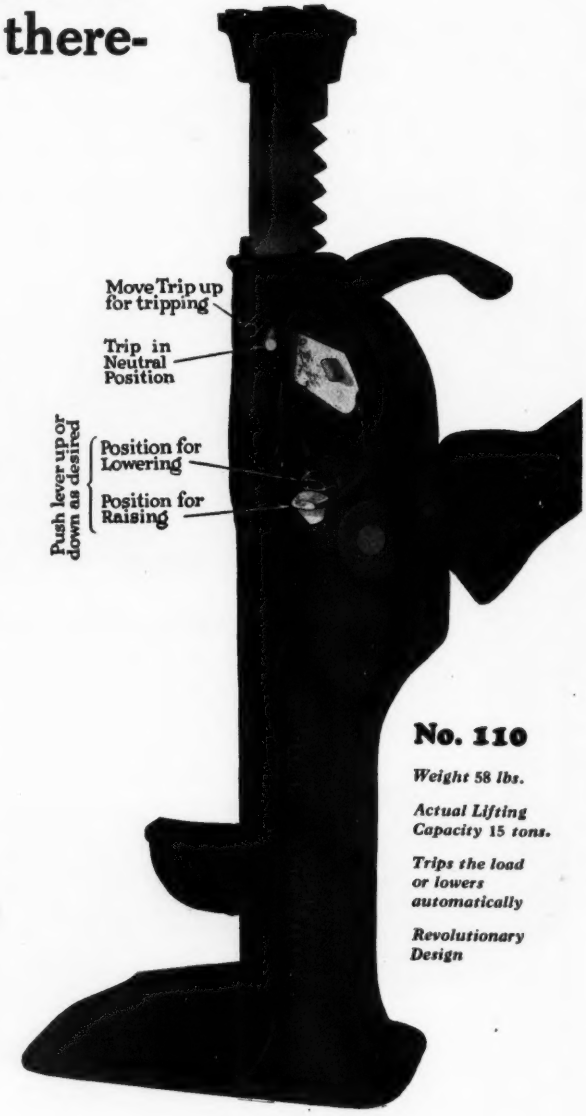
The design of the No. 110 is of the utmost simplicity—only four rugged working parts. Can be lowered automatically or tripped. The greenest track laborer in two minutes can learn all there is to be learned about its operation. It lowers notch by notch, by simple ratcheting, therefore all possibility of accidents to fingers is eliminated. It trips more easily than any 15-ton trip jack ever made—**one** man can do it where two were formerly required.

Write us now for free test and full particulars

THE DUFF MANUFACTURING COMPANY

Established 1883—Pittsburgh, Pa.

New York Chicago St. Louis Houston San Francisco Atlanta


Move Trip up for tripping
Trip in Neutral Position
Push lever up or down as desired
Position for Lowering
Position for Raising

No. 110

Weight 58 lbs.

Actual Lifting Capacity 15 tons.

Trips the load or lowers automatically

Revolutionary Design

Ask for **FREE** *Demonstration without obligation on your part*

Genuine Barrett

TRACK JACK no. 110

AMERICAN
AURORA, ILL.

THE Chicago & Northwestern Railway at Ashton, Illinois, uses an "American" deep well power head, furnished with a double acting water cylinder for local water supply.

Power heads of this type are popular for railroad work, as they are rugged, require but little attention, and develop gallonage at a comparatively low cost.

Railroad engineers interested in low cost water supply are welcome to the figures on the many railway "American" installations. Write our Engineering Department!

GENERAL OFFICES AND WORKS - AURORA, ILL.

THE AMERICAN WELL WORKS

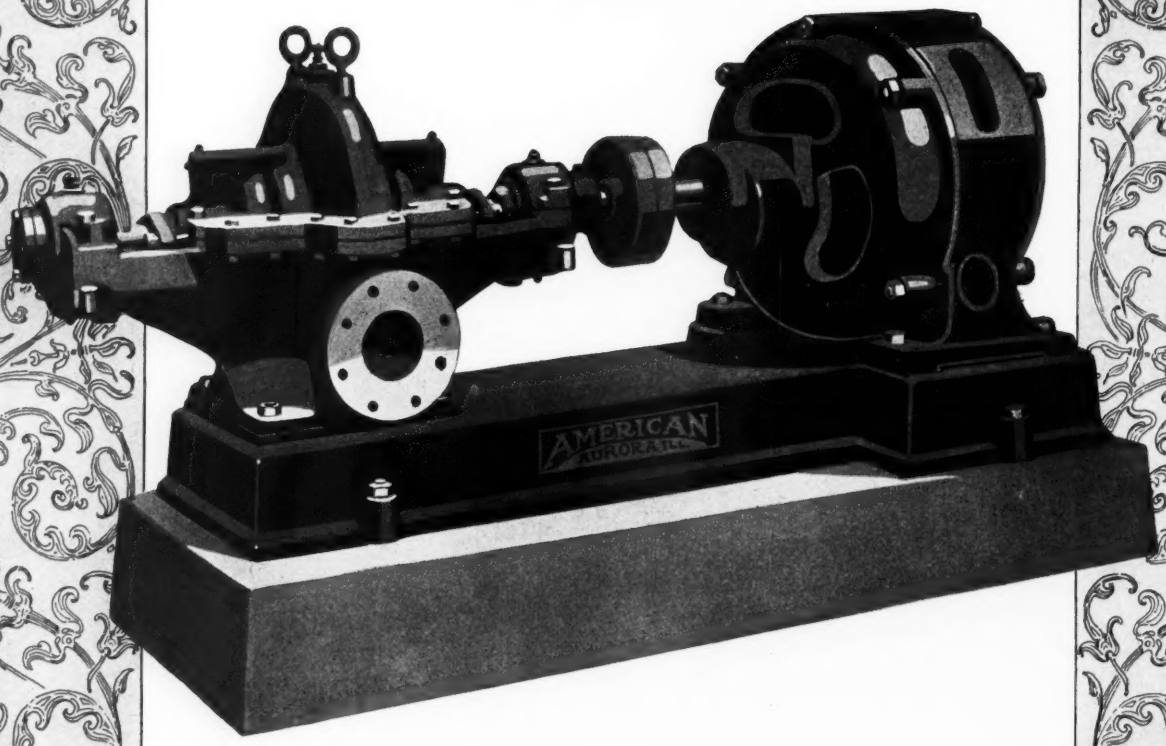
NEW YORK, N. Y. ..... 165 BROADWAY

BRANCH OFFICES

DALLAS, TEXAS .... WESTERN INDEMNITY BLDG.

MILWAUKEE, WISC. ..... WISC. NAT. BANK BLDG.

SAN FRANCISCO, CALIF. ..... 625 MISSION STREET



THE "American" type DSMD centrifugal pump is a horizontal split shell, single stage, double suction, centrifugal pump furnished with bronze enclosed impeller, bronze labyrinth wearing rings, bronze shaft sleeves and bronze split glands.

Pump is mounted on extended cast iron base to receive motor and is provided with flexible coupling of the pin and bushing type for direct connection to motor.

Pump is of the double suction type and is built in sizes from 2″ to 42″ and for designed heads up to 250′ depending upon size and capacity.

The bearings of the pump are entirely separate from the stuffing boxes which eliminates the possibility of any grit or water in the bearing. The oil reservoirs in the bearing are large, furnishing an ample supply of oil. The stuffing boxes are water sealed so as to insure tight packing without excessive pressure for friction on the revolving shaft.

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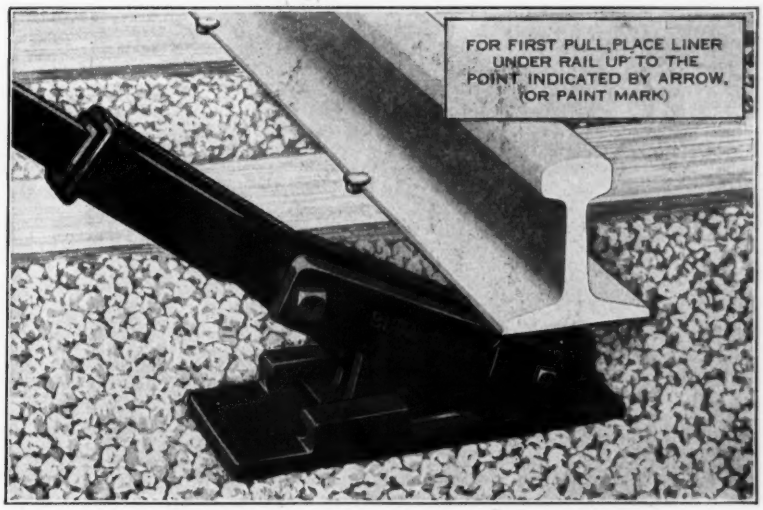
THE AMERICAN WELL WORKS

BUDA
ESTABLISHED 1881

BUDA-CLARK TRACK LINER

Pushes the track without lifting it



No wasted energy. Applies the most push in the right direction with the least effort.

Easy to handle. Easy to set as little or no digging is needed.

ONLY TWO LINERS REQUIRED

Weight only 35 lbs.
Made of malleable iron.
Size of base 14½"x6".
Square socket for use with standard lining bar.

Bulletin on Request

THE BUDA COMPANY

HARVEY [Chicago Suburb] ILLINOIS

30 Church Street
NEW YORK

Railway Exchange
CHICAGO

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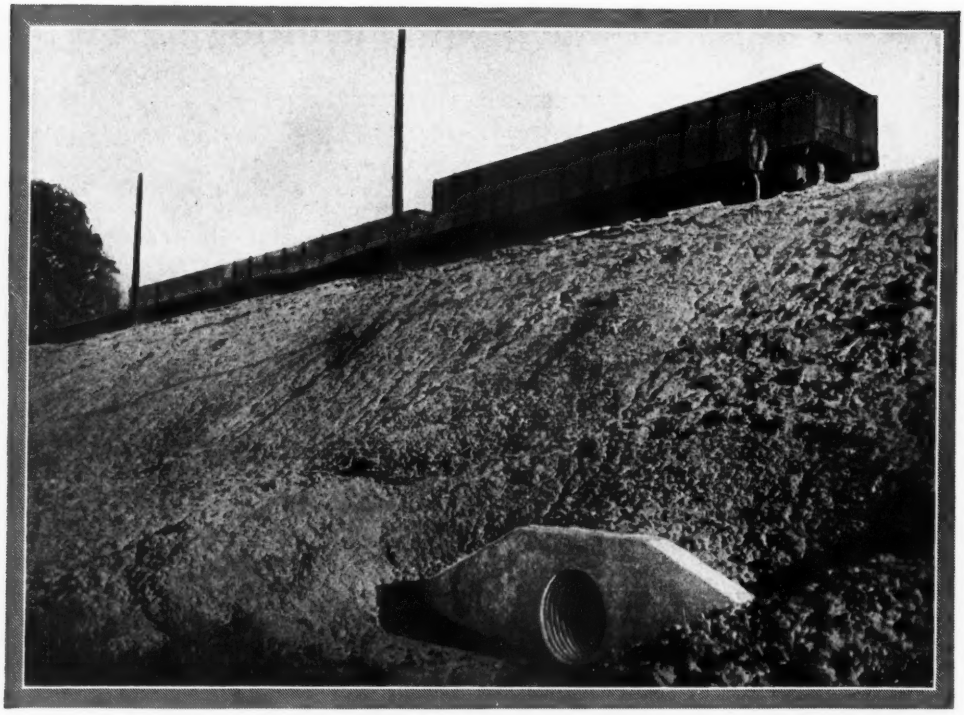
ST. LOUIS

664 Mission St.
SAN FRANCISCO

LONDON

ARMCO Culverts in Railway Service

No. 19 of a Series



Location: A California Railway, near Oakland, Cal.

Traffic: Average passenger and freight.

Installation Data: A 30-inch ARMCO Culvert, under a 60-foot fill of clay and gravel. Installed in 1910.

Condition: Excellent. No distortion. Photographed and inspected 1922.

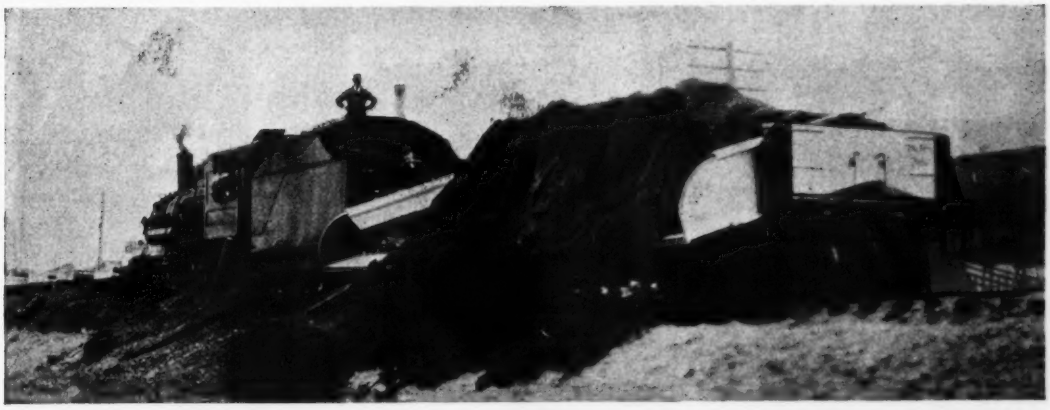
Remarks: This culvert replaced a long trestle 60 feet in height, eliminating all maintenance cost.

There is a manufacturer in almost every state and in Canada, making Culverts, Flumes, Siphons, Tanks, Roofing, etc., of genuine, rust-resisting Armco Ingot Iron. Write for full information and nearest shipping point on products in which you are interested

ARMCO Ingot Iron

ARMCO CULVERT & FLUME MFRS. ASS'N, Middletown, Ohio

ARMCO CULVERTS



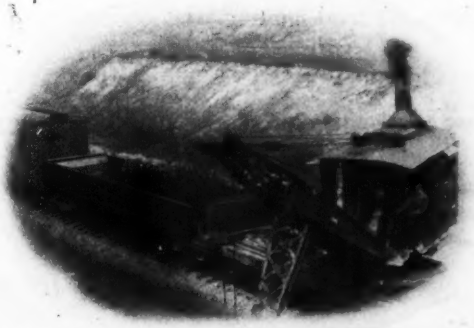
The Differential Air Dump Car—All Steel—30 Cu. Yds. Level Full

The DIFFERENTIAL AIR DUMP CAR

HAS MANY WAYS OF SAVING LABOR

A Few of Them—

1. There is no shoveling or spreading necessary. Differentials do not foul the Ballast. They discharge the load well beyond the ends of the ties and hold it there.
2. They are easier to load. In loading by hand the side door is let down without labor and shoveling is done at floor level. With a ditcher the low height allows the car to be more fully loaded and booming up is unnecessary.
3. They dump to either side without any change in mechanism.
4. They tip to a 50° dumping angle insuring clean dumping of very sticky material.
5. They distribute the load as desired. No shoveling necessary to get any desired quantity of material at any place.
6. They dump material of any size. There is no obstruction to discharge.



Complete description in Bulletin D-12

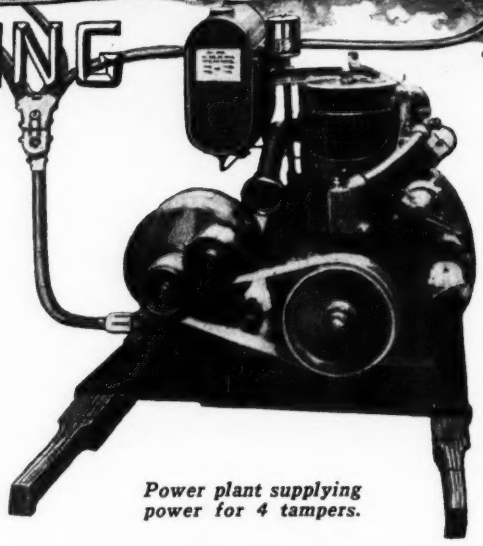
THE DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO

SINGLE TAMPING

WITH the Jackson Electric Tie Tamper it is only necessary to tamp from one side of the tie. The 4000 even strokes applied to the ballast each minute, will tamp to a distance of from 12 to 14 inches ahead of the bar.

Single tamping doubles the number of ties that can be tamped within a given time. Track so tamped holds up under heavy traffic.



Power plant supplying power for 4 tampers.

The 4-Tamper capacity Power Plant supplies the necessary power for work of this character, as well as for track saws, track drills, tool grinders and flood lighting. Its portability makes its use desirable.

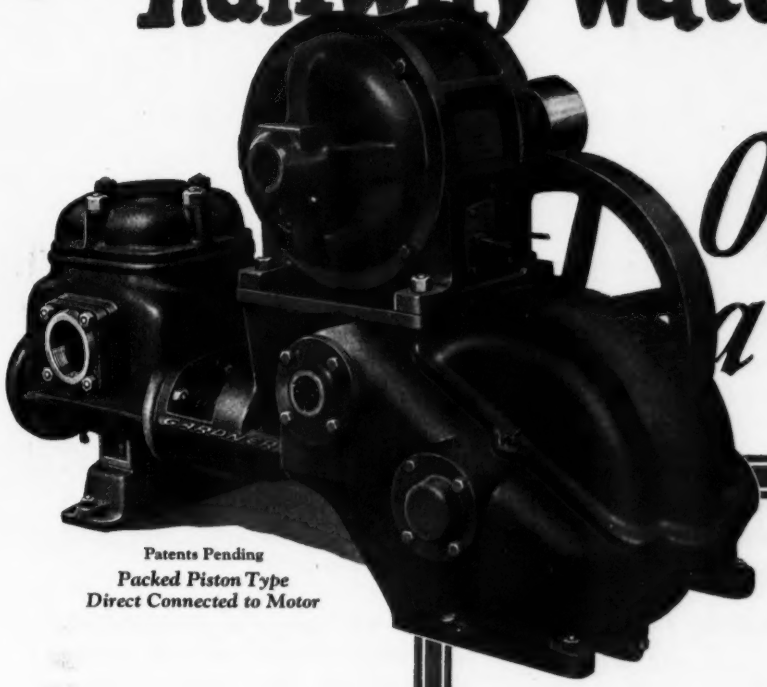
Let us show why many large roads are using this equipment.

ELECTRIC TAMPER & EQUIPMENT CO.

RAILWAY EXCHANGE CHICAGO, ILLINOIS

The Ideal Pump for Railway Water Service

Oil once a month



Patents Pending
Packed Piston Type
Direct Connected to Motor

Phantom View

The GARDNER totally enclosed, self-lubricating power pump is lubricated automatically from an oil reservoir, like an automobile motor. Requires a visit and oiling only once a month. Can be operated by an electric switch from any distance desired. The pump long needed for railway service. Ask for Bulletin EP-1.

Territory Still Available to Agents

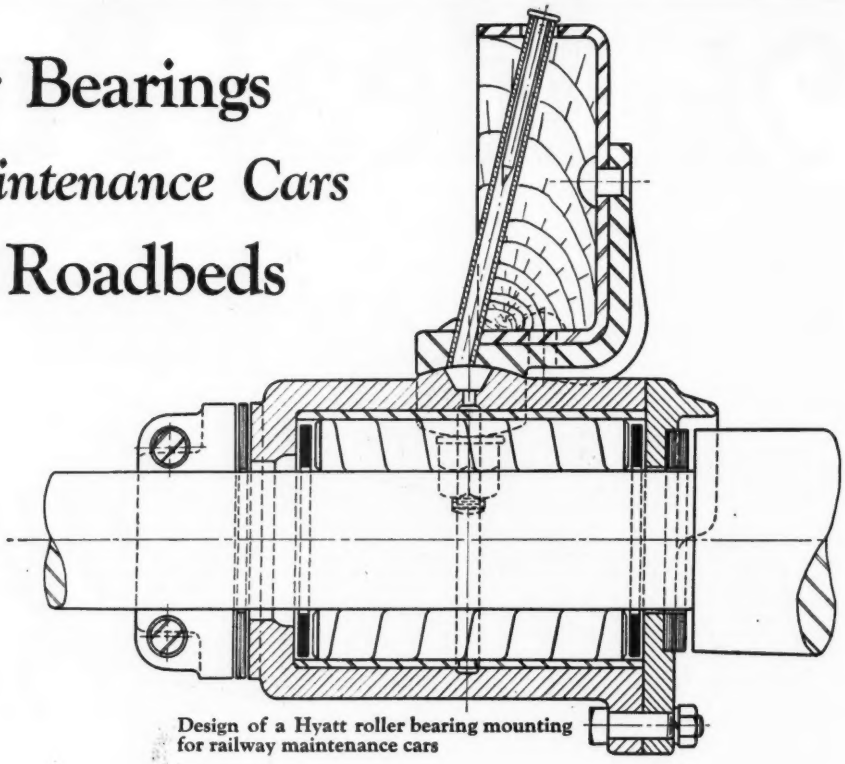
THE GARDNER GOVERNOR COMPANY
Quincy, Illinois

CHICAGO 549 Washington Blvd. | NEW YORK 534 Singer Bldg. | PHILADELPHIA 604 Arch St. | HOUSTON 718 Heights Blvd.
SAN FRANCISCO—400 Fourth St. | LOS ANGELES—419 E. Third St.

GARDNER
GOVERNORS
COMPRESSORS

GARDNER

Better Bearings
Better Maintenance Cars
Better Roadbeds



Design of a Hyatt roller bearing mounting for railway maintenance cars

NOW is the time to repair the ravages of winter and put your roadbed in condition to expedite the increased traffic of better business.

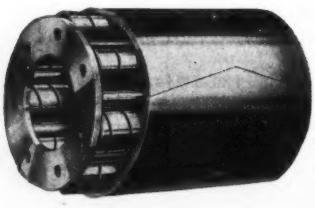
Better roadbeds are insured by better maintenance cars—cars which are always on the job and available at the point of need in the shortest possible time.

Such cars are assured when Hyatt roller bearings in the journal boxes guarantee easy running and long life free from bearing repairs.

Hyatt bearings are better bearings because they can always be depended upon. They banish worry about breakdowns. Their rugged strength is equal to the demands of heavy duty and overloading.

And Hyatt bearings are economical. They save fuel. They reduce oiling needs to three or four times a year. They cut maintenance costs.

To meet the needs of the emergency and to get the steady day-in and day-out service which results in better roadbeds, purchase better maintenance cars—equipped with Hyatt roller bearings. To bring your plain bearing cars up-to-date get Hyatt bearing replacement boxes.



Hyatt bearings are available for all types of railroad equipment. Ask for information on passenger and freight car bearings.

HYATT ROLLER BEARING COMPANY

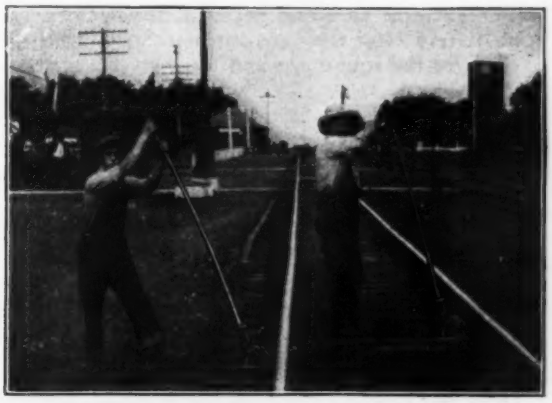
NEWARK DETROIT CHICAGO SAN FRANCISCO
WORCESTER PHILADELPHIA CHARLOTTE
PITTSBURGH CLEVELAND MILWAUKEE

HYATT ROLLER BEARINGS FOR RAILWAY MAINTENANCE CARS

The Giant Track Liner

More Power Exerted in the Right Direction

Open Position



The Giant Track Liner is not a theory. It was developed by a practical roadmaster on a large railroad system and has proved its superiority in actual service.

The GIANT Track Liners are real labor and time-saving devices that will pay for themselves in an unusually short time and no section should be without them.

They are a necessity on sections that are under-manned, as two men with two GIANT Track Liners can line a track that might otherwise be left in an unsafe condition, due to lack of a sufficient crew to do the work with ordinary lining bars.

Proof that two men with two GIANT Track Liners can line a track that requires three or four of other makes, and that four men with four GIANT Track Liners can line a frog or switch that requires six or seven of other makes, is all that should be necessary to warrant the adoption of the GIANT track Liner as a standard tool for all sections.

The time of the additional men necessary to operate the extra Track Liners when other makes are used and the cost of additional Track Liners for equipping the different sections is too big an item to be overlooked.

The GIANT Track Liner is operated by *pulling down* on the lever. This is a big advantage, as the operator can apply a greater load with less possibility of accident. There is no danger of the GIANT Track Liner slipping out from under the rail and throwing the operator.

The load is directly downward on the base of the GIANT Track Liner which prevents it from kicking away from the rail.

There is nothing about the GIANT Track Liner to get out of working order. It is simple in construction, easy to operate, and small enough to be carried on section handcars or motor cars without difficulty.

Manufactured and sold exclusively by

Gustin-Bacon Manufacturing Company

Kansas City **Philadelphia**

Write for further Information

Do You Get All You Are Entitled to When You Purchase Ties?

SUCCESSFUL tie preservation demands a sound tie to start with. A decayed or unsound tie cannot give satisfactory service no matter how well it is treated.

The extreme care and personal supervision of ties immediately after they are cut is in large measure responsible for the soundness and longevity of *International* Ties.

To secure sound ties, they must be properly cut and properly followed from the tree to the treating yard. The important fact to be remembered is that they must be ***Removed Quickly from the Woods.***

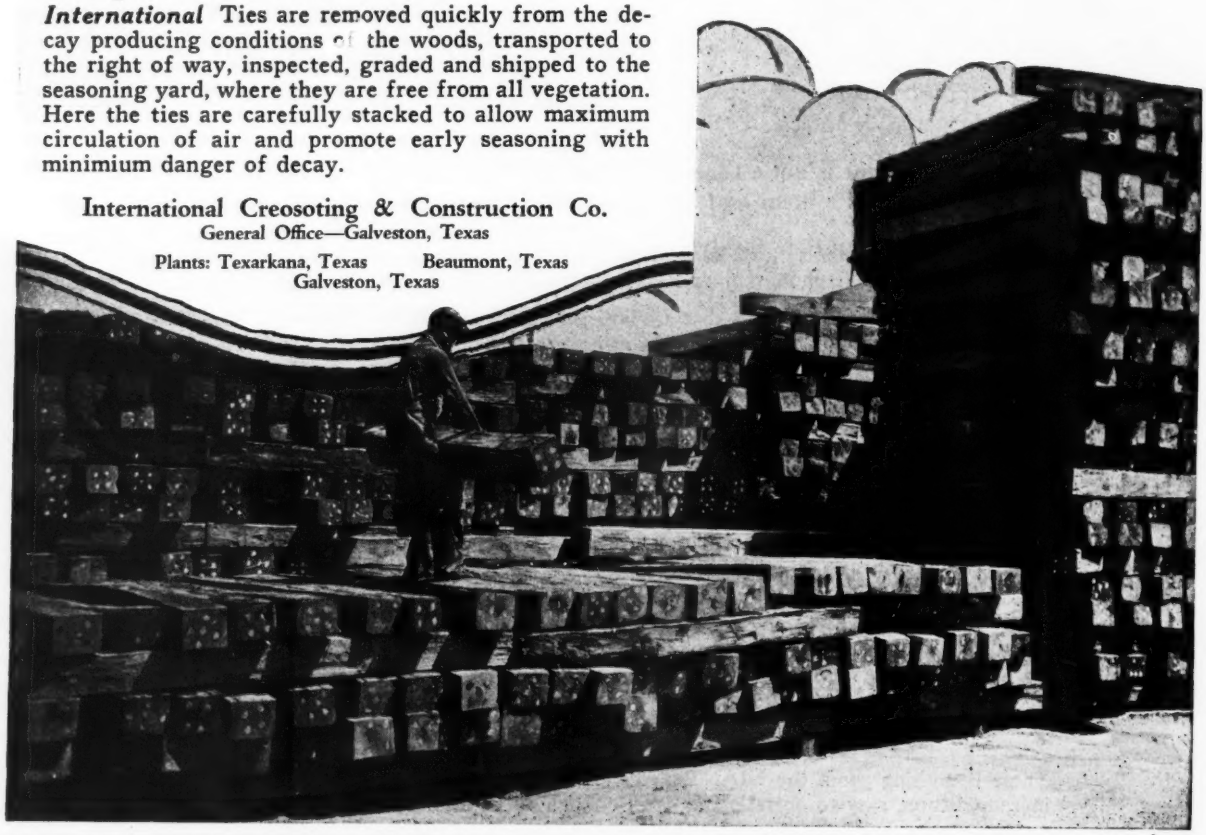
This period in the production of *International* Ties is given particular attention for its execution has a direct bearing on the ultimate life of the tie.

International Ties are removed quickly from the decay producing conditions of the woods, transported to the right of way, inspected, graded and shipped to the seasoning yard, where they are free from all vegetation. Here the ties are carefully stacked to allow maximum circulation of air and promote early seasoning with minimium danger of decay.

2¢5

The International Dating Nail is our guarantee of quality and your protection

International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas



International
Standard Specification Ties

NEW HACKMANN TRACK LINER

THE HACKMANN COMBINATION LINING BARS AND BASES SAVE 50% OF YOUR TOOL COST

HACKMANN Track Liners Will Line Track, Frogs, Switches, Space Ties, Raise Low Joints, Without Disturbing the Road Bed. No Digging Necessary

60% Labor Cost Saved

3 Men With Hackmann Track Liners Do the Work That Required 9 to 12 Under the Old Method Hackmann Track Liners Will Pay For Themselves By the Saving in Labor Cost

NO. 1 LINING BAR

HACKMANN COMBINATION LINING BARS
(VERONA MADE—HEAT TREATED)

The No. 1 lining bar with chisel end and the No. 2 combination tamping and lining bar are drop forged from special steel specially tempered with 1-inch drop forged lugs as an integral part of the bars, for use with Hackmann bases.
Tests on different roads have proven conclusively that the new Hackmann Combination Track Liner gives more than double the efficiency of any liner now on the market.

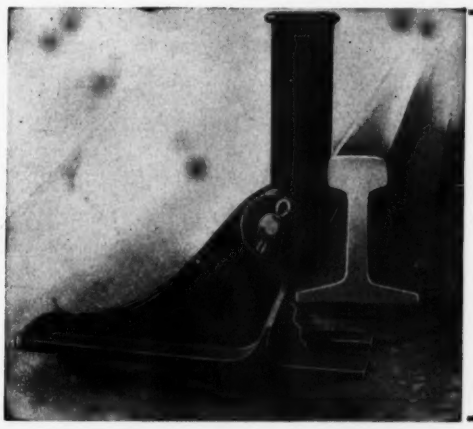
DEMONSTRATIONS

We Will Gladly Demonstrate the Efficiency of This Equipment Upon Request

NO. 2 TAMPING AND LINING BAR

NOTE THE TWO STEP FEATURE AT TOP OF BASE

Weight 20 lbs.



The IDOL TRACK LINER

NOW IN USE ON 86 RAILROADS

The Idol Track Liner will line track frogs, switches, space ties, raise low joints without disturbing the road bed as no digging is necessary. They will pay for themselves every day by work you will be able to do with a few men. They will save you 50% in labor costs.

THE HACKMANN RAILWAY SUPPLY CO.

RAILWAY SAVING DEVICES
723 So. Wells St., CHICAGO, ILLINOIS

VERONA TOOL WORKS
New York, N. Y. Boston Mass.
Washington, D. C. Verona, Pa.
San Francisco, Cal.

FREDERICK HACKMANN,
President and Mechanical Engineer

LAUGHLIN & CHENEY
Chicago, Ill.
W. D. ACHUFF
St. Louis

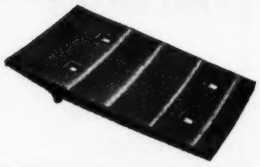
BALDWIN LOCOMOTIVE WORKS
Foreign Representatives
WM. ZEIGLER CO.
Minneapolis, Minn.

J. J. FRANZEN,
Secretary and Treasurer

THE HOLDEN CO. Ltd., Canada
Toronto Montreal Winnipeg
Vancouver

LUNDIE TIE PLATE

Prevents cutting of a single fibre of the tie



TIE protection against mechanical wear depends entirely upon the type of tie plate used.

Money spent on costly treated ties is lost when the cutting ribs of ordinary tie plates eventually break down the wood fibers allowing moisture to go below the safety line of penetration. Premature decay then prevents the treated tie from delivering its full return on the investment.

By scientific design the Lundie Tie Plate develops beneath the plate a hardened wear-resisting surface that assures absolute tie protection under the heavest traffic conditions.

It is this tie conservation and fewer replacements that bring to railroads substantial savings in maintenance cost. This sound basis of ultimate economy each year is influencing more roads in their choice of the Lundie Tie Plate.

The Lundie Engineering Corporation
920 Broadway, New York
166 West Jackson Boulevard, Chicago

LUNDIE DUPLEX RAIL ANCHOR

Tie Plates That Protect

Note remarkable surface protection on illustrated tie after 8½ years under the heaviest traffic conditions.

Pneumatic Tie Tamping

A 4-Tool Tie Tamper Compressor. Two other sizes to operate eight or twelve tampers can be furnished.

The easiest and most economical way to make good track

Ingersoll-Rand Pneumatic Tie Tampers tamp ties at less than half the cost of hand methods. It has been definitely proved that four men with pneumatic tampers will tamp more track per day and do a better job than 12 to 16 men using hand picks and bars. With the untiring power of compressed air, a firm and solid bedding is secured which other tamping cannot equal.

Ask for actual cost record of operation of pneumatic tie tamping outfits

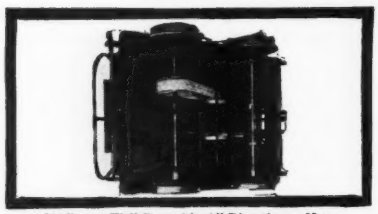
INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY

Offices in principal cities the world over

FOR CANADA REFER—CANADIAN INGERSOLL-RAND CO., LIMITED, 260 ST. JAMES STREET, MONTREAL, QUEBEC

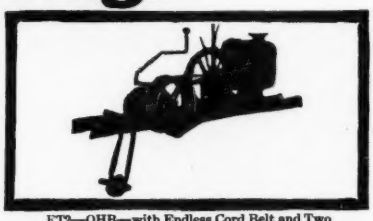
Ingersoll-Rand

Setting the Pace of Progress In Motor Car Design

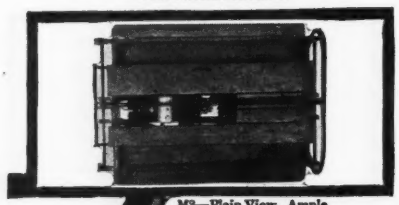


M2 Frame Well Braced in All Directions. Note Thrust Collars on Axles.

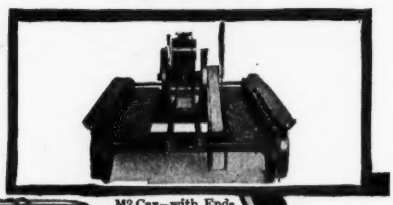
FAIRMONT leads in scientific research and development work on track motor cars. No expense is spared whose entailment promises a still wider margin of comfort, safety and economy. Extensive investigations and tests that others might consider too costly or unnecessary are being made daily by **Fairmont** Engineers.



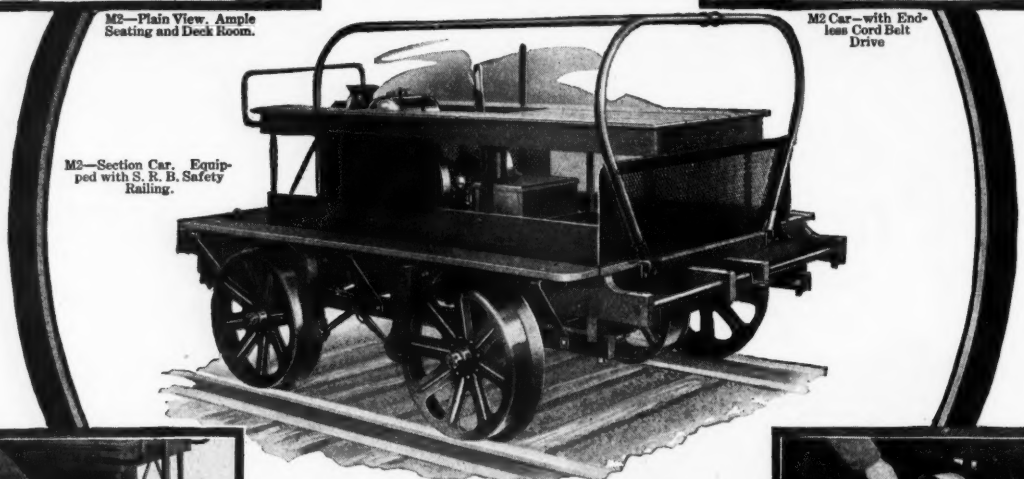
ET2—QHB—with Endless Cord Belt and Two Speed Transmission.



M2—Plain View. Ample Seating and Deck Room.



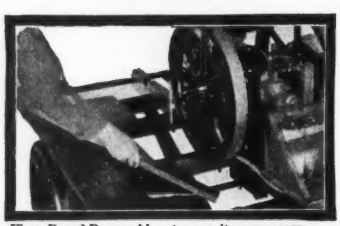
M2 Car—with Endless Cord Belt Drive



M2—Section Car. Equipped with S. R. B. Safety Railing.

Handy Tool Box—Large enough and deep enough for all Tools and Oil Cans.

Quick Detachable Pulleys—Make possible the use of Drive Pulley best suited for work in hand.

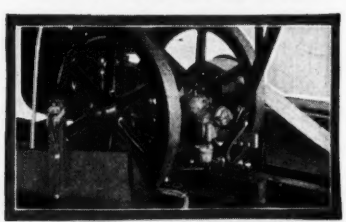


Floor Board Removable—to permit easy access to Flywheel without loosening Engine Bolts.

As a consequence, **Fairmont** Railway Motor Cars are always first with improvements—many of which are later imitated by the industry at large. Outstanding examples of Fairmont leadership in motor car design are the 3-Bearing Ball Bearing Crankshaft, the Throttle Control, the Belt Drive and the Unit Construction of the power plant which assures ready accessibility of all parts.

The Fairmont MT-2 Extra Gang Car is an M-2 Car Equipped with a 2-speed Motor Car Transmission.

Fairmont Railway Motors, Inc.
Fairmont, Minn.



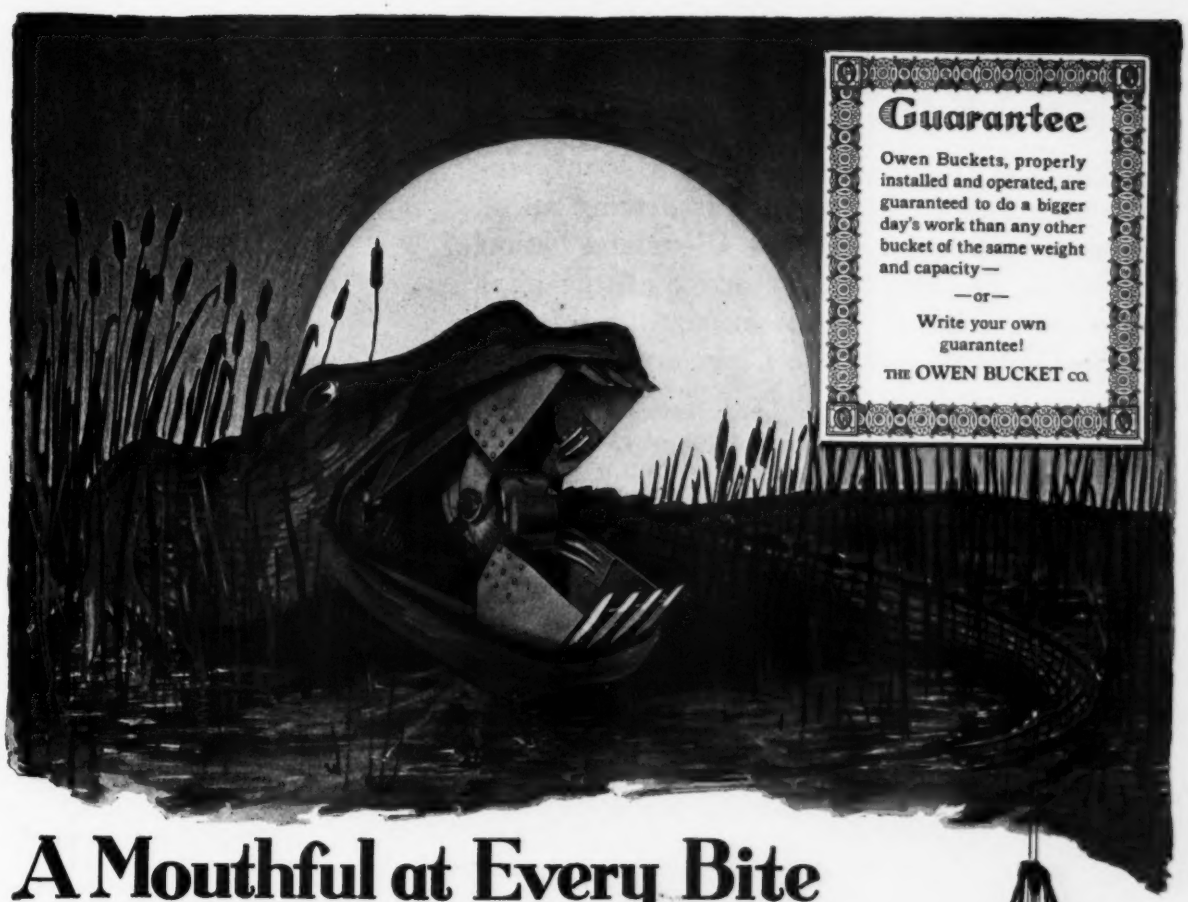
Note Several Notches in Sliding Base Link for Belt "Take-up" and Pulley Change.

Performance on the Job Counts

Fairmont

Ball Bearing Engines and Railway Motor Cars

District Sales Offices:
New York
Chicago
St. Louis
San Francisco
Washington, D.C.
Winnipeg, Can.


Guarantee
Owen Buckets, properly installed and operated, are guaranteed to do a bigger day's work than any other bucket of the same weight and capacity—
—or—
Write your own guarantee!
THE OWEN BUCKET CO.

A Mouthful at Every Bite

The crushing strength and the quick, sure snap of the crocodile's jaws insure his mouthful at every bite. And like the Owen Bucket, the ruthless swamp monarch tolerates no hinderance in his savage attack.

An Owen Bucket possesses the unusual capacity for "digging in" and taking a chuck-full bite every time. (1) A patented "cushion stop" permits the cutting edges to hit the material first without racking the bucket to pieces. (2) Instead of scraping over the material when the closing line is overhauled, the centrally located and low slung weight holds the bucket to the ground and makes the jaws dig for a capacity load.

These are but two of the nine points in superior construction that mark the Owen as a Bucket which means a greater value for your digging dollars.

We want you to know more about the Owen Bucket. Folder 2-A will tell you in detail about its strong and sturdy construction, its adaptability, its earning power.—Send for it.

This ¾ yard type "J" digging bucket is one of four owned by D. Lowensohn, Cleveland. It is shown here doing the "digging in" job of excavating pipe line trenches.

THE OWEN BUCKET COMPANY
605 ROCKEFELLER BUILDING -:- CLEVELAND, OHIO

New York, Pittsburgh, Philadelphia, Baltimore, Chicago, St. Louis, Miami, Los Angeles, Dallas, Portland ,Minneapolis, San Francisco.

OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAYS WORK

Owen Buckets

INSURE A BIGGER DAY'S WORK

© O. B Co

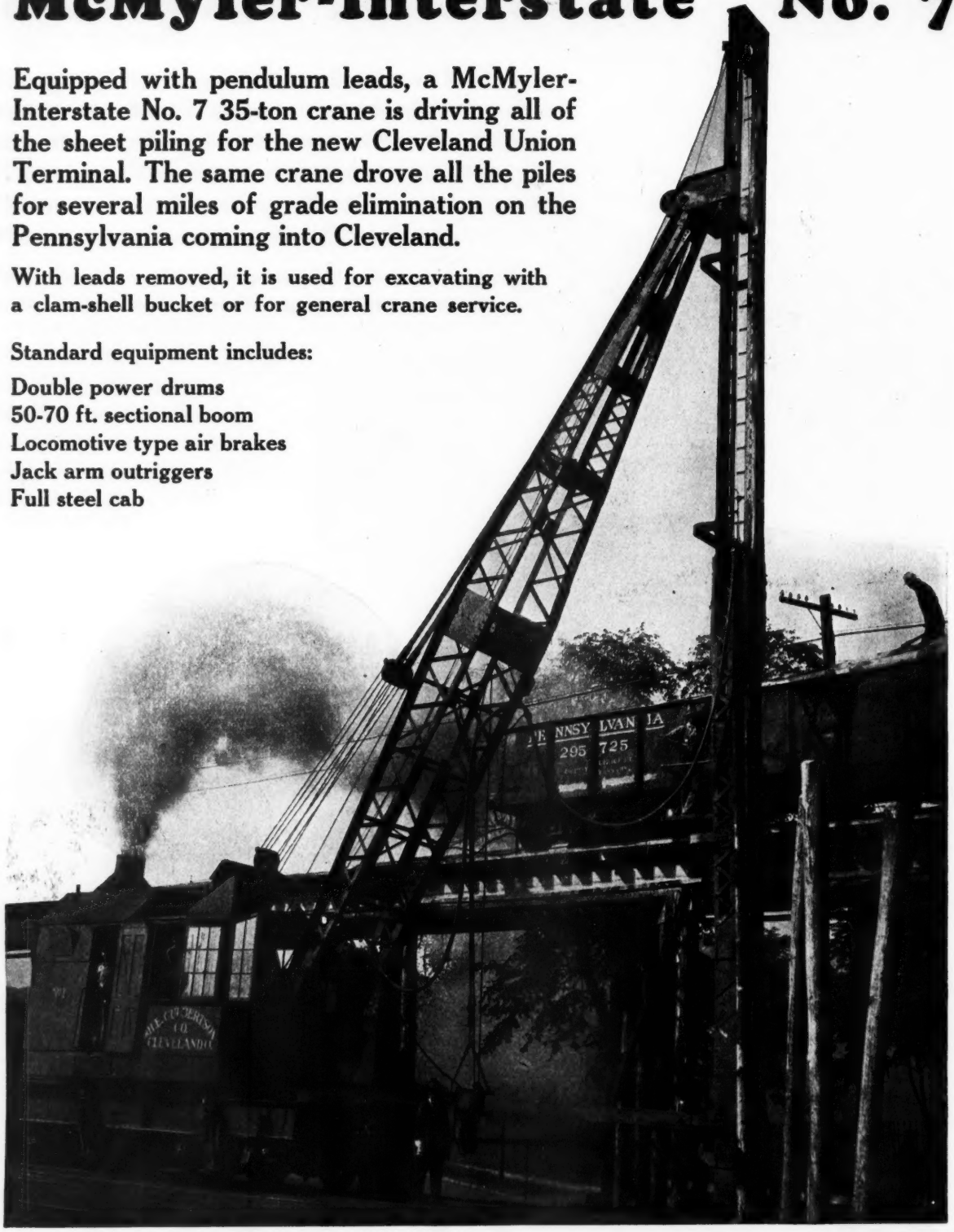
McMyler-Interstate No. 7

Equipped with pendulum leads, a McMyler-Interstate No. 7 35-ton crane is driving all of the sheet piling for the new Cleveland Union Terminal. The same crane drove all the piles for several miles of grade elimination on the Pennsylvania coming into Cleveland.

With leads removed, it is used for excavating with a clam-shell bucket or for general crane service.

Standard equipment includes:

Double power drums
50-70 ft. sectional boom
Locomotive type air brakes
Jack arm outriggers
Full steel cab



Pile Drivers Derrick Cars Locomotive Cranes Car Dumpers
Bridge Cranes Clam-shell Buckets Locomotive Forgings

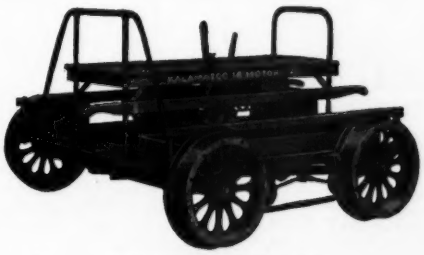
C-7-13

THE McMYLER-INTERSTATE CO. CLEVELAND

NEW YORK CHICAGO PITTSBURGH DETROIT

KALAMAZOO

MOTOR CARS



KALAMAZOO NO. 16
For Supervisors, Roadmasters, Signalmen and Linemen.

A safe, one man car with plenty of room for two or three men to ride comfortably.

Equipped with a powerful horizontal air-cooled motor of special design, driving through multiple disc clutch and roller chain to rear axle, step starter and magneto ignition. The loose axle is under the heavier end of the car making it possible for one man to easily remove car from track.

ECONOMICAL IN OPERATION

KALAMAZOO NO. 16-L
A light car for Inspection Service.

The Kalamazoo No. 16-L Motor Car has the same power plant as on the No. 16, but by the use of smaller wheels, a shorter frame and lighter body, the weight is reduced, making it the lightest Motor Car on the market.

The car is particularly designed for one-man inspection service, but will carry two men comfortably if desired.

For Supervisors, Bridge Inspectors, or Signal Maintainers, this car cannot be excelled.

DEPENDABLE IN SERVICE

KALAMAZOO RAILWAY SUPPLY CO.

MANUFACTURERS

KALAMAZOO, MICHIGAN, U. S. A.

CABLE ADDRESS "VELOCIPEDE"

KALAMAZOO

WRITE FOR OUR CATALOGUE

Coated AFTER The Culvert Is Formed • • NOT Made From Galvanized Sheets

THERE IS A GREAT DIFFERENCE

Thousands and thousands of feet of corrugated culvert pipe are today giving good service commensurate with their cost. They have been made of good materials. They have been formed from galvanized sheets of high quality.

But there are many places where greater durability and greater strength are required. For installations of this kind Wheeling Hand Dipped Culverts are recommended.

By the Wheeling process, the culvert is first formed from Ohio Metal (Copper Bearing Steel) *Black Sheets*, and there is no coating to be affected by the severe stresses to which these sheets are subject in forming. Not until the forming is entirely completed is the coating applied. Then the culvert section is immersed in pure molten zinc, and the heavy coating that adheres to surfaces and edges remains permanently, without crack or fracture. And the zinc coating is from one and one-half to two times heavier than is obtained by any other method. It is true that almost any desired thickness of coating can be applied to the culvert by this method.

Here, therefore, in Wheeling Hand Dipped Culverts, is the added protection of a perfect heavy coating on an exceptionally durable and rust-resisting metal.

The difference is shown in detail by means of micro-photographs, reproduced in a folder which we will be pleased to send at your request.

WHEELING CORRUGATING COMPANY
WHEELING, W. VA.

NEW YORK	ST. LOUIS	CHATTANOOGA	MINNEAPOLIS
CHICAGO	KANSAS CITY	PHILADELPHIA	RICHMOND

Wheeling
HAND DIPPED CULVERTS

The Sheffield 44

Note the high safety rail and automobile type pressed steel frame. By taking out four bolts the entire body can be lifted free from the chassis, giving full access to the engine and driving mechanism.

The heart of the new "44" is this simple, foolproof clutch with cooling fins and other finely worked out details that insure positive but velvety action and prevent burning out.

No more tugging at a *tension lever* —

No more delays for repairing broken belts—no more "strong arm tactics" on the grades—that is the achievement of Fairbanks-Morse engineers revealed in the new Sheffield 44, one-cylinder water-cooled motor car.

The many advantages of chain drive—the positive delivery of power at the wheels, and great reduction of maintenance—have been still further increased by the development of a clutch that has a particularly smooth action and *cannot* be burned out. This clutch and driving unit is illustrated above. Note the large faces with cooling fins that dissipate the heat. It is this construction that has made perfect clutch control a reality in the new "44".

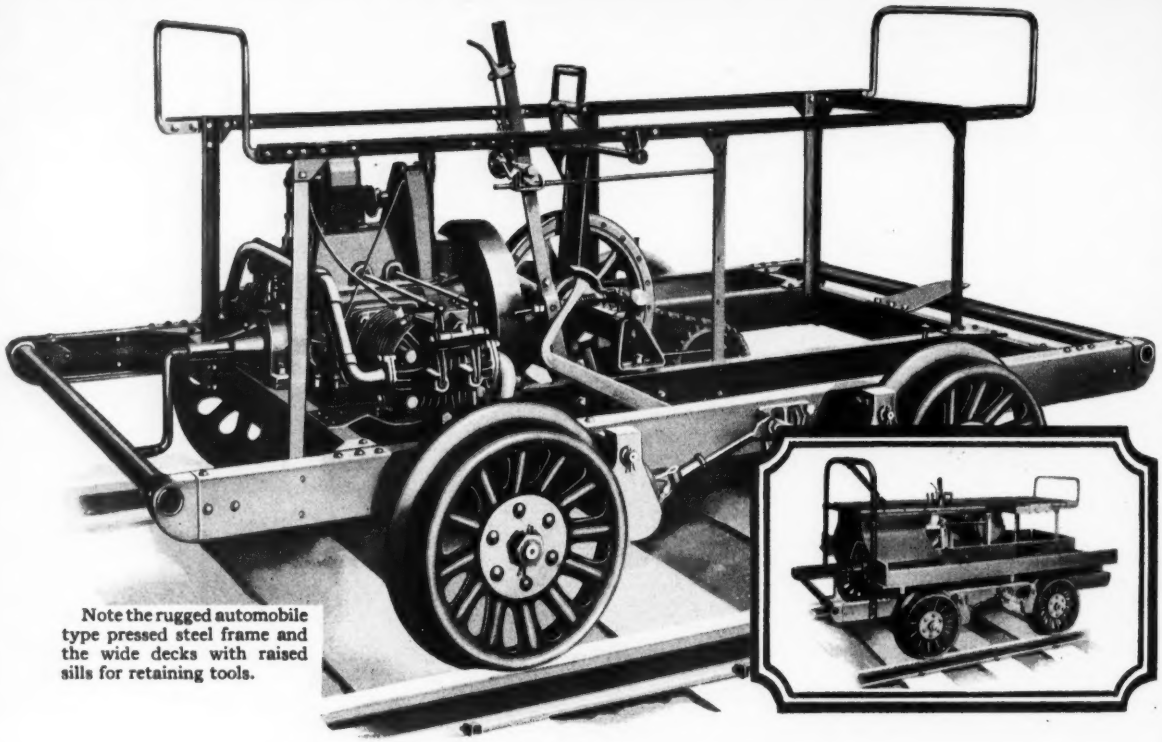
Men who know section cars have proclaimed the "44" the leader of its class. They base their opinion not only on the perfected drive but on the many other evidences of advanced design—such as the fully accessible engine, the pressed steel auto type frame, and the exceptionally light weight considering the ruggedness of the car.

Remember, the "44" is simply one of the many Fairbanks-Morse Section Cars that have been blazing the trail of motor car development for more than thirty years.

The new two-cylinder Sheffield 40-B is described on the next page. Bulletin information will be mailed on request.

FAIRBANKS-MORSE
MOTOR CARS

First on the rails — *and still first*



Note the rugged automobile type pressed steel frame and the wide decks with raised sills for retaining tools.

A *new* Sheffield 40-B—*better than ever*

Those who are familiar with the former "40" will be surprised to find that it has been possible to add refinements which will mean even better performance and greater economy.

The many excellent features that have won so many friends for the former model are retained, but the car has been more highly developed in every detail. The engine now represents the sum-total of all that is best in automotive practice. The crankshaft is mounted on Timken Bearings, which absorb the thrust of the greatly simplified friction transmission. Three-point suspension of the engine insures perfect alignment.

Absolute rigidity is made a certainty by the use of a new automobile type pressed steel frame—probably the strongest frame ever used on a car of this type. The axles turn in Timken Taper Bearings which absorb the thrust and radial loads, preventing the cutting of the axles that is almost inescapable when plain bearings are used.

In every respect you will find the new "40-B" a worthy representative of the complete line of Fairbanks-Morse motor cars that have held a position of maintained leadership in their field for more than thirty years.

Ask for bulletin information.

Coaling Stations

The finest of equipment backed by undivided responsibility permanently guarantees every coaling station that is

Built throughout by
FAIRBANKS-MORSE

FAIRBANKS, MORSE & CO., Chicago

Manufacturers of railway motor cars, hand cars, push cars, velocipedes, standpipes for water and oil, tank fixtures, oil engines, steam power and centrifugal pumps, scales, complete coaling stations.

24 branches in the United States, each with a service station

FAIRBANKS-MORSE
MOTOR CARS

First on the rails —and still first

A—769—526—033 M

THE OXWELD RAILROAD SERVICE COMPANY

representing

THE LINDE AIR PRODUCTS CO.
(Linde Oxygen)

THE PREST-O-LITE CO., Inc.
(Prest-O-Lite Acetylene)

UNION CARBIDE SALES CO.
(Union Carbide)

OXWELD ACETYLENE CO.
(Oxweld Apparatus and Supplies)

Railway Exchange
Chicago

30 East 42d Street
New York

Stop! wasting money on R.R. RAIL ROAD CROSSING INGS

BITUROC Crossing, Fortville, Ind.

Construct Them With

BITUROC
TRADE - MARK

Natural Kentucky Rock Asphalt

BITUROC Crossing, Cincinnati, O.

Bituroc is a natural bituminous sandstone quarried and pulverized at our plant at Summit, Hardin County, Kentucky.

Bituroc is the most practical pavement for railroad crossings because it is delivered on the job ready to be laid COLD. Any section crew with the aid of rakes and a roller (large one not necessary) can lay it satisfactorily.

Bituroc is waterproof, noiseless, dustless and exceptionally non-skid.

Bituroc, due to its elasticity and resiliency, will withstand the vibration and impact of combined vehicular and rail traffic, where a more rigid type of pavement will crack and disintegrate under the strain.

Bituroc is also used extensively for station platforms, roadways, walks, etc.

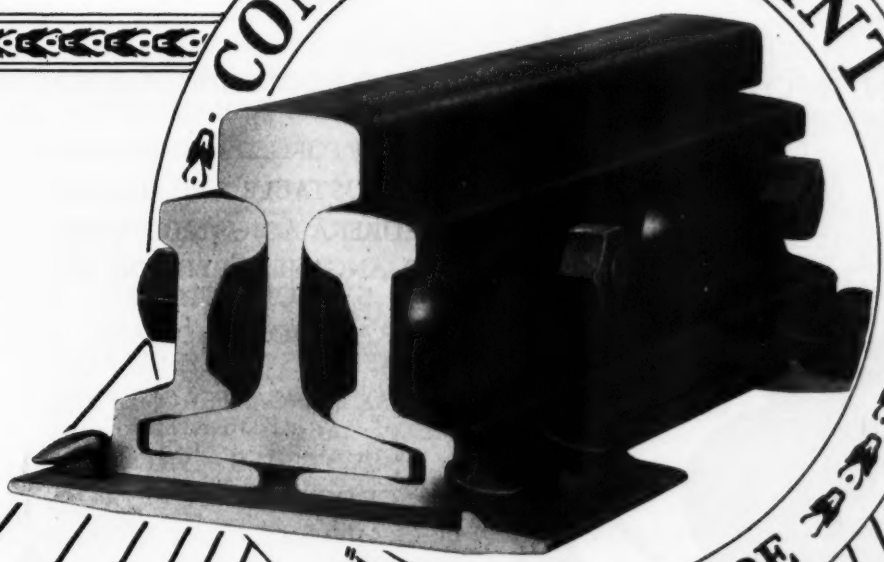
WRITE FOR SPECIFICATIONS

Ohio Valley Rock Asphalt Company

Incorporated

916 Schmidt Bldg. **Cincinnati, Ohio**

CONTINUOUS JOINT



"HEAD FREE" TYPE

IF YOU WERE TOLD HOW TO END THE COST OF RAIL JOINTS ON YOUR RAILROAD WOULD YOU NEGLECT THE OPPORTUNITY TO TELL YOUR SUPERIOR ABOUT IT

?

WHY NOT FIND OUT HOW SUCH A THING IS POSSIBLE ASK US AND WE WILL TELL YOU HOW TO GET THE PROVEN FACTS

?

The Rail Joint Company

61 BROADWAY, NEW YORK CITY

RACOR

SEVEN WORKS
RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SUPERIOR, WISCONSIN
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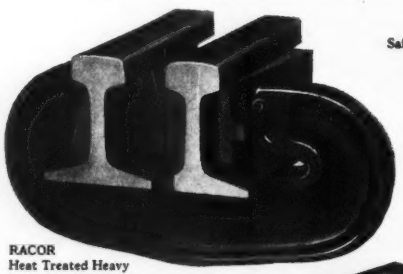
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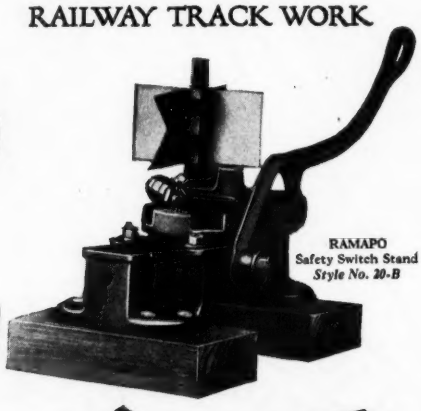
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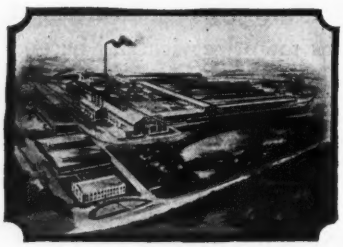

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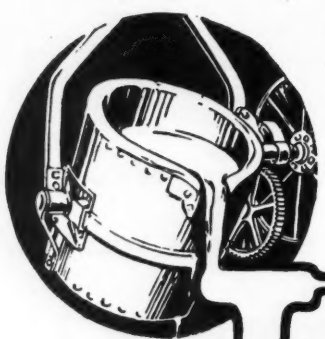

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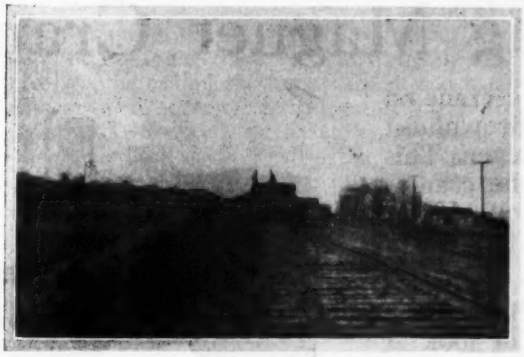
Filling the yards at Elevator A, Argentine, Kansas, Santa Fe Railroad work. The cars are Western 30-yard automatic air dump cars equipped with aprons.



Santa Fe yard work—After dumping. Note position of dumped material.

WESTERN Automatic Air Dump Cars equipped with aprons for railroad use are making a great hit with railroad men wherever installed.

They are two-way dump cars operated by air and dumped instantly in either direction without previous preparation. Move the lever one way or the other—that's all.

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Why is it that on the Illinois Central's Edgewood-Fulton Cut-Off (contract work) seven out of eight dump car installations are Western and on the new Pennsylvania's Canton-Bayard Cut-Off in Ohio (contract work) the installation of Westerns is almost 100 percent?

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Let us tell you why and refer you to enthusiastic railroad men who are using Western aprons cars in maintenance and betterment work. Write today for Catalog M-61.

Western Wheeled Scraper Company

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Earth and Stone Handling Equipment

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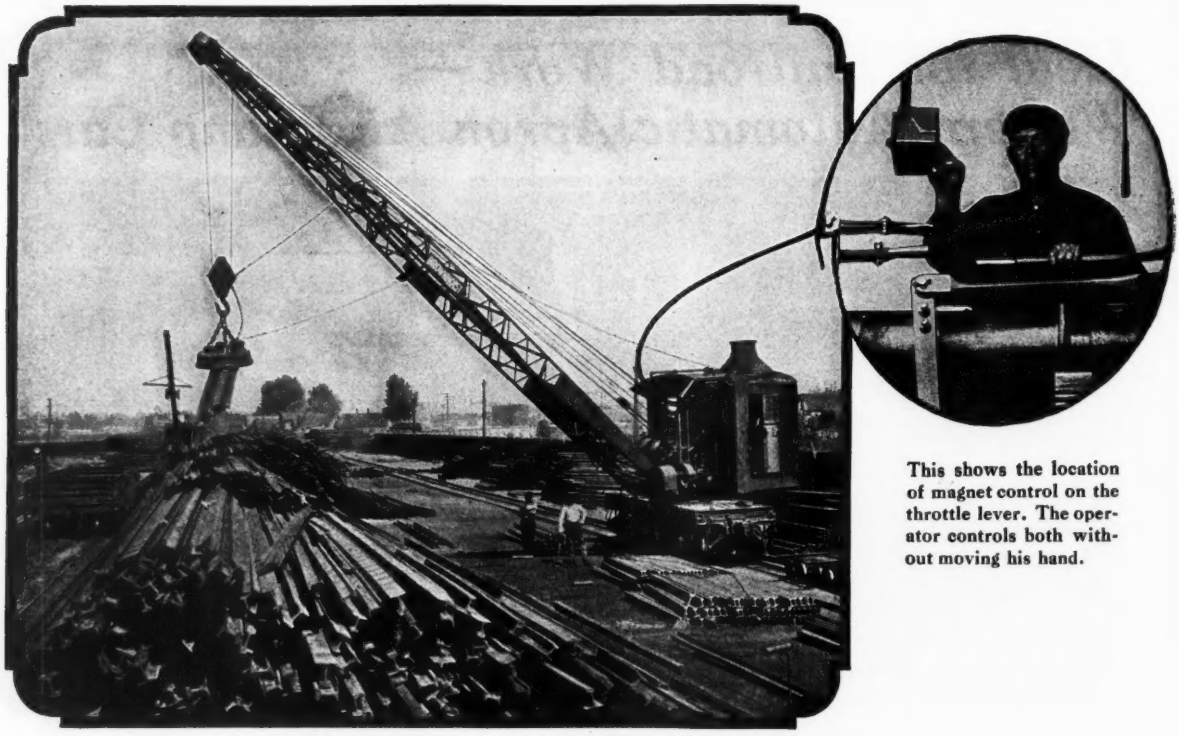

This shows the location of magnet control on the throttle lever. The operator controls both without moving his hand.

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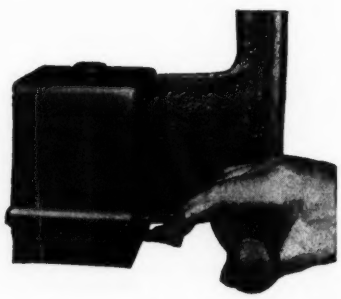
In operating a steam crane the operator keeps his hand on the throttle at all times and with the Brownhoist crane he does not have to move his hand or look at the throttle to turn on and off the current in the magnet. This gives greatly increased operating speeds and the magnet operation becomes almost automatic.

Brownhoists are built in many sizes on railroad trucks or creepers. Literature explaining how well one of these cranes will do your work will be promptly forwarded on request.



The current in the magnet is switched on and off by means of two buttons controlled by the operator's fingers.

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Railway
Engineering and Maintenance

Volume 21 June, 1925 Number 6

MORE MOTOR CAR SETOFFS

THE MOTOR car is commonly recognized as standard equipment for maintenance of way gangs outside of terminals on all but the most congested multiple track lines. Without question it is here to stay. In the manufacture of these cars the builders face two conflicting requirements. On the one hand the roads demand cars with strength sufficient to enable them to withstand the wear and tear of service. On the other hand they also demand a car of light weight that can be lifted off the track readily, particularly for use on western roads with long mileages of branch lines where the forces are reduced to a foreman and one or two men in the winter.

In the operation of a car a gang is constantly confronted with the possibility of having to take the car off the track quickly at any point to clear a train, an operation which frequently leads to difficulty, particularly in returning the car to the track. Not infrequently the attempt to take the car off the track on high and narrow embankments or in narrow cuts in front of a train leads to accidents. To reduce these hazards many roads can well study their lines to see whether they have provided setoffs at sufficiently frequent intervals and at the points of greatest hazard and if not, to initiate measures to add others. These setoffs are small in first cost and, once installed, require little attention, while their value is continuous.

DO NOT FORGET THE BRANCH LINE MAN

THE term "branch line" as commonly used is purely relative, employed to designate the secondary or less important line. Thus a main line in one system may carry less traffic and be maintained to lower standards than a branch line in another. Likewise the proportion of branch line mileage varies widely on different roads.

The railway without branch lines is unique. On the typical large western railway system approximately half the mileage is commonly classified as branch line and this proportion may probably be considered to apply universally. As a result nearly 150,000 miles of railways in the United States and Canada may be included within this category. The maintenance of this vast mileage is therefore no small problem in the aggregate.

The biblical saying that "to him that hath not shall be taken away," applies pertinently to the branch line supervisor or foreman. He is resigned to the fact that new and heavy rail, stone ballast and the other materials that go to maintain strong track and structures shall be confined to the main lines. He is also reconciled to the fact that extra gangs and modern labor saving equipment shall be employed there, while he must maintain his track and structures without these aids.

Because of the severe limitations on his expenditures the problems of the branch line man are all the more acute and make necessary a greater display of initiative. A prominent railway executive stated recently that if he were to look beyond the confines of his own road for an officer he would turn first to a road of limited financial resources, for men who had been trained by necessity to secure the maximum results from their expenditures. It is in this direction that the branch line man has an opportunity to display initiative which will bring him to the attention of his superior officers, for the man who has learned the value of a dollar through such a schooling will not forget it when he comes into possession of larger appropriations. That railroad will develop its maintenance practices along the most economical lines which will look carefully over the men on its branch lines when a vacancy develops on the main line.

"DITCH ON MONDAY"

THE importance attached to adequate track drainage on one western road is such that not many years ago it was the standing practice to require all section gangs to "ditch on Monday." By this means those in charge of maintenance gave evidence of their belief that systematic prosecution of drainage measures would reduce the amount of time which would be required for lining and surfacing and other roadway tasks, a thought not sufficiently appreciated at even this late date on many roads. As an example, the division officers in charge of maintenance of an important main line division of a western railway, faced with the necessity for retrenchment last fall, stopped the ditching work then in progress, leaving the division program half completed. During the winter the roadmaster found it necessary to do a larger amount of shimming than for several years. Without realizing the significance of this condition he called it to the attention of his superior officers casually. These officers immediately undertook an investigation which showed that the difficulty was confined almost entirely to the portions of the division on which the ditching had been postponed. The lesson was obvious. A large part of the money saved by the abandonment of the ditching was spent for shimming and the ditching still remains to be done.

There is another angle to the slogan quoted at the head of this discussion. When the practice of "ditch on Monday" was inaugurated, this ditching was done by hand and it was considered advisable to devote one-sixth of the time of the section forces to the performance of this one task during the summer months. Since that time mechanical equipment has come into more general use and as a result a greatly increased amount of work can be done with the expenditure of a small fraction of the labor otherwise required. The use of this equipment, therefore, not only reduces the cost of

this work but enables it to be done with relatively little demand on the time of track forces. For this reason and also because of the fundamental necessity for drainage, every road should include a sufficient complement of ditching equipment in its roadway equipment to insure that adequate drainage can be provided at all times and having secured this equipment, should see that it is kept busy.

YOU MAY NEED IT LATER

IN SPITE of every effort that the editors may make, it is not to be expected that every reader of *Railway Engineering and Maintenance* will find something of direct value to him in every article in each issue, or even in those relating to his particular branch of the department. This might be possible in the case of a paper published for the railway officers of a small country like Denmark or Holland but in a journal whose readers are scattered from the Atlantic to the Pacific and from Mexico to Alaska, so wide a range of conditions must be covered in presenting the thousands of problems imposed on railway men that matters which are of vital concern to men in one part of the country may be of no consequence to those in another part.

This contrast is brought out sharply in this issue. One article deals with the fight to keep weeds out of track, while another tells of efforts being made to make some sort of vegetation grow on the right-of-way and roadbed. It is not to be expected that the roadmaster in charge of track in eastern Texas who is fighting Johnson grass gets direct benefit from an article that tells how sweet clover may be made to grow in dry sand in Wyoming. Nevertheless it will do him no harm to know something of the work of the roadmaster in another part of the country. There is just as much reason why he should interest himself in railway problems of no direct bearing to his work as there is for him to read of matters that have no relation to railroads at all—because it will make him a broader man, a more valuable man to his company.

But can a man always be sure that a certain piece of information never will be of benefit to him at some time in the future? He knows rather definitely what problems confront him today but is he so sure of the problems of tomorrow? The railroads on the American continent are large. Many of them traverse territories embracing a variety of climatic and geographical conditions and under the prevailing policy of transferring men from one district to another it often happens that a maintenance of way officer who has been employed under one set of conditions may some day find that he is responsible for tracks or structures which present problems of an entirely different nature.

THE RAILWAYS AS PIONEERS

Transportation is the first essential link in the chain of commerce and the exchange of commodities. The movement of persons and things within the frontiers of a state and between nation and nation marks the progress of civilization, and those states which have developed an adequate system of transport have correspondingly increased in opulence and power. Restriction of intercourse in primitive days, and a refusal to maintain communication with the outer world, were the fundamental characteristics of the savage.

In all countries the railway has been a necessary forerunner of national development. The opening of the United States and Canada to settlement would have been enormously retarded if it had not been for the courage and enterprise of those who conceived and executed the great railway systems of these two countries. They were indeed the pioneers of empire, and played as great a part in the erection of the commercial and industrial edifice of the United States and Canada as any statesman who has earned the applause of his fellow countrymen.—*From an address by Sir Henry W. Thornton, chairman and president of the Canadian National Railways, at the University of Chicago.*

A MOTOR CAR PERFORMANCE STANDARD

WHAT IS the maximum percentage of time that one may reasonably expect a motor car to be available for service? This is a question which is now receiving serious consideration on some roads. It warrants equal attention from the others.

A motor car, considered individually, does not represent a large investment. On a large railway, however, with 1500 or more cars in service, it represents an outlay of more than half a million dollars, the interest on which is nearly $100 a day. From this angle it is evident, therefore, that this subject warrants careful consideration.

More important, however, is the fact that a motor car is a unit of equipment which is furnished to maintenance of way gangs to aid them in increasing their output of work. Methods of work are being developed more and more around the motor car as a transportation agency. With cars it is possible to bunch gangs for large operations, to haul material from headquarters to point of use and carry out a wide variety of other tasks to greater advantage. As a result when a car fails for any reason, these methods are disorganized and the work of the gang is interfered with more seriously than if the less rapid but more simple hand car was employed.

All of these considerations point to the necessity for the adoption of those measures which will insure the maximum reliability of service of the motor car. It is here to stay. Its value has been demonstrated so thoroughly that it is no longer open to serious question. The problem is to so develop methods for its maintenance that the maximum benefits can be secured.

The first step in the development of a plan to secure the maximum reliability of performance is a survey to ascertain the extent to which the cars are out of service and the reasons for their failure. With this information a road is in a position to adopt the measures necessary to bring the performance up to the proper standard if it is below that point. Principal among these measures is the inauguration of some means of local supervision of motor car operation, which is usually effected by the employment of experienced maintainers whose primary duty is the instruction of the foremen regarding the care and operation of their cars so that abuse may be eliminated and the need for further attention reduced to the minimum. Supplementing this, the maintainer is in a position to give "first aid" assistance to cars, thereby relieving the foremen of the necessity of "tinkering" with their cars and enabling them to be kept out of the shop and at work as long as possible. Supplementing these measures some of the roads which are securing the highest degree of reliability in

the operation of their cars maintain central motor car repair shops where the cars are overhauled at intervals, those which have been damaged in accidents are rebuilt, and spare engines and other equipment kept in stock for shipment where needed on a moment's notice.

These measures, while apparently elementary, are lacking on so many roads as to warrant the conclusion that motor car maintenance has not yet received the attention which it deserves.

IS THIS WORTH A TRIAL?

FOR a number of years the Portland Cement Association has advocated what is known as the Abrams method of "designing concrete mixes" or the determination of the proportions of cement, aggregates and water necessary with any given aggregate to obtain a predetermined compressive strength of the concrete at 28 days. The foundation for this method is the "water-cement ratio." The peculiar significance of this is that it has been found by tests that concretes in which the proportions of cement to water are the same will have the same strength regardless of the kind or quantity of aggregate used, so long as the aggregate is of sound material and is used in such a way as to make a workable mix. This may be stated in another way. A certain proportion of cement and water mixed alone will produce a mortar of a certain strength and the adding of sand and stone to this mortar *without introducing any more water* results in no change in the strength so long as the resulting concrete mixture is workable, that is, that it makes a practical concrete. The purpose of the Abrams method, therefore, is to provide the means of determining the maximum amount of sand and stone which can be used with a given amount of cement and water within the limits of workable concrete.

This method represents a marked departure from established practice in proportioning concrete, which has been based for many years on the assumption that given proportions of cement, fine and coarse aggregate will give a relatively uniform strength, regardless of the amount of water used or of the particular nature of the aggregate. Obviously, it is much simpler to specify 1:2:4 or 1:3:6 as the proportions for concrete than it is to work out the most desirable proportion according to the Abrams method. Once the new method is understood it is readily applied, but a clear understanding of it calls for painstaking study. For this reason concrete builders have been slow to adopt it, but those who have, are entirely satisfied that they have been more than repaid for their efforts by the better and more uniform quality of the concrete produced.

The railroads have been equally as reluctant as other users of concrete in taking up this method. But four of them, the Cleveland, Cincinnati, Chicago & St. Louis; the Louisville & Nashville; the Central Railroad of New Jersey; and the Pennsylvania, have proportioned large quantities of concrete according to the Abrams method to the entire satisfaction of those who have had the work in charge. The manner of applying the process on the Big Four was described in an article appearing in *Railway Engineering and Maintenance* for October, 1924, page 387, while the method pursued on the Pennsylvania in constructing a large bridge at Pittsburgh, is described in an article by T. P. Watson appearing in this issue.

Many railway engineers are skeptical of the practical application of this method, particularly with regard to its use on smaller jobs. However, nearly all who have to do with the making of concrete are agreed that there is room for improvement in the results. In the interest of better concrete, is it not therefore worth while to make a thorough trial of the method?

Letters to the Editor

GOOD FOREMEN ARE ESSENTIAL

Wellington, Ill.

TO THE EDITOR:

The first thing necessary if the railroads are to maintain their tracks in condition to carry traffic is to have skilled foremen. A good foreman will always stay close to his gang and see that the work is done in a workmanlike manner. He will take particular care in seeing that inexperienced men are taught to do their work.

But even if the railroads employ good foremen, they cannot get good results if the skilled trackmen are laid off every fall, for they will go to work somewhere else in the spring and make it necessary for the railroads to hire untrained men. Do the railroads pay enough attention to this problem? JOHN MITCHELL.

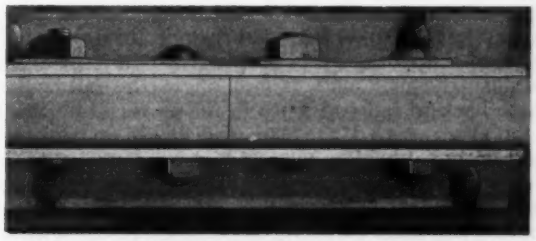
IMPROVEMENT IN SPIKES NEEDED

Montreal, Que.

TO THE EDITOR:

Many attempts have been made since the beginning of our present type of track construction, to improve the hook spike as a better means of fastening the "T" rail to the ties, but we still have it with us today and perhaps hear less objections to its use now than we did a generation ago. While various types of screw spikes have been gotten up there has been little change in the design of the original hook-headed spike itself, apart from a few changes in the points or body of the spikes, to give it better resistance against vertical pull. Hook spikes are still being made with the same overhang or hook, or even increased over the ones first used.

In the earlier days of track construction these spikes were depended on far more for holding rails in place or against overturning than now. Where hardwood ties were used, this hook did have a certain function in pre-



Top View of a Rail Joint Showing That the Spikes Do Not Clear the Nuts and Heads on the Bolts

venting the overturning of rails. This was especially true for inside spikes on curves. While there are still many who believe this to be one of the chief duties of the spike, the idea is entirely erroneous where the present tie plate construction is followed. Apart from holding rails in alignment until loads are applied, spikes are a minor factor in keeping rails to gage. Friction between tie plates and ties is the one main agent in determining this.

Now that spikes retain their original position with the rail base throughout the life of the spike and ties, due to their being driven into holes in tie plates with the tie plate shoulder carrying the lateral thrust, there is no further use for the extra long hook on the spike other than enough to allow the ties to follow the rails upward when rails or track are to be lifted. With a shorter overhang, spikes could easily be made with symmetrical heads. Such a head could be more easily driven by the trackmen. This

is especially true where used on the inner side of rails placed on tie plates with a cant of 1 in 20. With shoulder tie plates now in use, there is no further need of the reinforced shoulder on the spikes, as they take no wear. It is well to have a good fillet under the head to avoid heads breaking off too easily, but this can be applied quite naturally when the head is being formed in the machine. A ¼ in. taken off the hook side and applied to the back means a lot to the man using a maul on a hardwood tie. Then, too, a flatter head will tend to striking the spike squarely over body of the spike.

Recently I noticed a photograph showing in plan a Chicago, Burlington & Quincy joint and the way the hook of the spike shows under the head of the bolt. This is a true condition but can only occur through distortion of some sort. The hook, too, cuts a lot of bond wires, as every signal man and track man well knows.

EMMET KEOUGH,
Assistant Engineer Maintenance of Way, Canadian Pacific.

HOW CAN WE MAKE OUR WORK ATTRACTIVE TO THE MEN?

Parsons, Kan.

To the Editor:

Conditions are now such that the railroads in many parts of the country must depend very largely on foreign-born men for their track and bridge building forces. Europeans predominate in a large portion of the country, while Mexicans are largely employed in the Southwest and a considerable number of Japanese in the Western states. Many of these men become efficient employees but I do not believe that they are the equal of native Americans. The trouble is that many of our own young men do not care to work, preferring to spend their time in loose talk or idleness around pool halls, while the more responsible and serious minded among them get work in other lines of employment.

If we are to attract these men we will have to provide better living quarters, such as small two or three room houses adjacent to stations, with a part of the right-of-way fenced off for gardening. It will also be necessary to adjust maintenance appropriations so that more of the work will be in progress the year around, because the man who is laid off in the fall will not come back to railroad work in the spring if he can get a job elsewhere. More attention should be paid to the cars provided bridge gangs which must serve as their living quarters for a large part of the time. The young man entering employment in a bridge gang ought to find a good bunk awaiting him in a clean car with adequate toilet facilities for keeping himself clean.

It is also necessary to show the young man that the future has something in store for him. He should be given an opportunity for advancement as he becomes more skillful and efficient in his work with the eventual possibility of becoming a foreman.

W. SPRENGER,
Bridge and Building Foreman, Missouri-Kansas-Texas.

New Books

Proceedings of the American Society for Testing Materials. Part 1. 1,173 pages. 6 in. by 9 in. Bound in paper or cloth. Published by the American Society for Testing Materials, Philadelphia, Pa.

This book contains the proceedings of the twenty-seventh annual meeting of the American Society for Testing Materials held at Atlantic City, N. J., on June 24-27, 1924. Its contents include the complete committee reports of the society and the discussion relating to them in a section of 760 pages, the tentative standards in a section of 349 pages and information on tentative revisions of A. S. T. M. standards in the remainder of the volume.

Field Engineering. By the late Wm. H. Searles and H. C. Ives. Illustrated. Two volumes. 4 in. by 6¾ in. Volume 1, 335 pages, 152 figures. Volume 2, 348 pages. Flexible binding. Bound separately or together. Published by John Wiley & Sons, Inc., New York.

This is the nineteenth edition of Searles' handbook, as it is commonly called among railway engineers, and represents an extensive revision and enlargement of the previous edition, necessitating the resetting of the entire text. Material additions have been made to the chapters on reconnaissance, preliminary surveys, location, curves, turnouts and crossings, cross sections, earthwork, haul, track laying and others. The arrangement of subjects has been altered slightly in order that similar or related topics may be more closely grouped. A few omissions have been made covering some special problems of rare occurrence. Volume I of Field Engineering includes the text relating to the theory and practice of railway surveying, location and construction, while Volume 2 is purely a book of tables accompanied by an explanatory text.

Mathematical Tables. By the late Wm. H. Searles and H. C. Ives. 4 in. by 6¾ in. 132 pages. Flexible binding. Published by John Wiley & Son, New York. Price $1.25.

The book contains a large number of mathematical tables which for the most part are reprinted from the handbook on field engineering by the same authors. To these there have been added selected tables from Professor Merriman's American Civil Engineering Handbook, resulting in a complete set of mathematical tables of pocket size and suitable for office, home or field work.

Proceedings of the American Railway Bridge and Building Association. Edited by C. A. Lichty, secretary of the association. 270 pages, illustrated, 6 in. by 9 in. Bound in cloth and paper. Published by the association, 319 North Waller avenue, Chicago.

This volume contains the complete report of the thirty-fourth annual convention of the association held in October, 1924 at Kansas City, Mo. In addition to addresses by J. F. Holden, vice-president of the Kansas City Southern, and R. H. Aishton, president of the American Railway Association, these proceedings contain the reports of committees on the placing of concrete in winter, the maintenance of water stations, smoke jacks for roundhouses and the inspection of painting. These reports were supplemented by the presentation of individual papers by prominent engineers describing important structures principally in the vicinity of Kansas City. These included papers on the bridge work of the Kansas City terminals by J. V. Hanna, chief engineer, Kansas City Terminal Railway, Kansas City, Mo.; the North Kansas City bridge by Ernest E. Howard, consulting engineer, Kansas City, Mo.; the Eads bridge at St. Louis, Mo., by C. E. Smith, consulting engineer, St. Louis, Mo., and the construction of the Union Pacific bridge at Kennewick, Wash., by Glen H. Trout, bridge engineer, Union Pacific System, Omaha, Neb. Two contributions to the program which were worthy of special mention were a paper on fire hazard of treated timber by C. S. Heritage, bridge engineer, Kansas City Southern, Kansas City, Mo., and a paper on the effect of maintenance on the design of railroad bridges by John Lyle Harrington, consulting engineer, Kansas City, Mo. The proceedings of this association will constitute a valuable addition to the library of the maintenance officer.

The Dredge, Barges, Tow Boat and Car Loading Plant on the Ouachita River

How The Cotton Belt Developed A Good Supply of Ballast

Discovery of Large Deposits of Gravel in Ouachita River Solved Most Serious Problem of General Surfacing Program

THE MAINTENANCE of tracks in certain parts of this country is seriously hampered by the absence of suitable ballast material within reasonable limits of haul. This is the condition which confronted the Northern division of the St. Louis Southwestern for many years.

Until recently the only ballast material which had been developed between Paragould, Ark., and Texarkana, a distance of 316 miles, was what is known as hill gravel, which had proved unsatisfactory because it contained 60 per cent of clay and loam. This section of the line had been ballasted with this material, averaging about 3,000 cu. yd. per mile, in 1903 and 1904, with some re-ballasting thereafter until the period of federal control. At the end of the federal control period an extensive program of re-ballasting became necessary. The experience of one of the company's officers in obtaining an excellent quality of gravel from the Ouachita river while employed on another line which obtained a large quantity of ballast from that river several years before, suggested the possibility of finding a satisfactory ballast gravel in the Ouachita river in the vicinity of Camden, Ark. The river rises in central western Arkansas and flows in a southeasterly direction, crossing the Cotton Belt near Camden, where it occupies flat bottom lands covered with a heavy growth of trees and brush, substantially wild land subject to little cultivation or other use.

Find Gravel of Good Quality

This stream was found to contain large beds of a good quality of gravel for ballast use. It contains so little loam or alluvial material that it is suitable for use without washing. The relative proportions of sand and pebbles is such that no screening is necessary, particularly as there is a singular absence of oversize pebbles or boulders. The gravel occurs in the largest quantities in bars or shoals along the convex banks at bends in the river, test holes showing depths of from 22 to 27 ft. of gravel at such points.

A reconnoissance of the river bottoms in the vicinity of the railway crossing near Camden led to the selection of a site for a ballast plant on the east bank several miles upstream from the town, which could be reached by the construction of a five-mile spur track from a point on the main line four miles north of Camden. Estimates based on data obtained from test holes indicated the presence of 750,000 cu. yd. of gravel within a short distance of a convenient site for the loading plant. In fact, the only limit on the supply was the maximum practical operating radius, that is, the effective distance between the excavating equipment and the car loading facilities. Because of this fact and some apprehension as to the possibility that floods in the river might at some time so alter the stream as to remove a considerable part of the gravel beds close to the plant, it was decided to take advantage of the fact that the stream is navigable by adopting a type of plant that would be independent of changes in the location of the gravel beds. In other words, it was decided to do the excavating with a dredge boat and transport the gravel from the boat to the car loading plant on barges.

The Plant

Accordingly authority was granted for the construction of the five-mile spur and Harrington, Howard & Ash, consulting engineers, Kansas City, Mo., were retained to study the requirements of the ballast plant and design the necessary facilities. These included a dredge, three barges, a tow boat and a car loading plant. The dredge is substantially a large barge equipped with a steam power plant for the operation of a 2½-yd. excavating bucket by means of a large

steel boom supported from a heavy timber A-frame on the forward end of the deck. Three heavy timber spuds were provided to hold the dredge against the current while working. Three barges of wooden construction with a capacity of 1½ carloads of gravel each were originally provided. On account of their small capacity and some difficulty experienced in caulking them, they have recently been replaced with three steel barges of four carloads' capacity each. The tow boat is of the stern paddle-wheel type, operated by a four-cylinder gas engine purchased from the Buffalo Gas Engine Motor Company.

Overhead Loading Plant

The loading plant comprises a steel frame stiff-leg derrick with a 90-ft. boom mounted on a platform carried on four standard car trucks which in turn rest on two parallel trestle tracks 153 ft. long, spaced far enough apart and having their decks at a sufficient elevation to give ample operating clearance for a loading track occupying the space between them. The derrick platform is covered with a shed that houses the boiler and hoisting engine for the operation of the derrick, which is equipped with a large clam-shell loading bucket. The two trestles or runways also

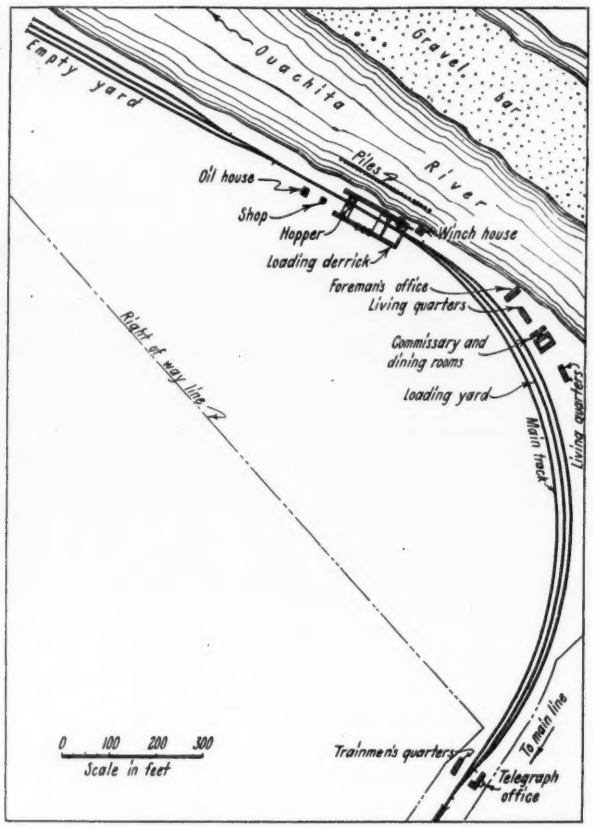
The Tow Boat "D. W. Bowker"

serve as a support for a second platform, also mounted on car trucks which carries a large wooden hopper, the essential function of which is to act as a funnel with its outlet accurately centered over the loading track for concentrating the flow of gravel into cars spotted on the tracks so that it is not necessary to handle the buckets so carefully in dumping. This facility makes it possible to handle the buckets much more quickly than would be the case if it was necessary for the operator to time the dumping of the bucket with sufficient accuracy to insure that the load was dropped within the width of a car.

The plant was designed with the idea that the derrick and hopper platforms would be moved back and forth along the trestle runway to meet various positions of the barges and cars, but after putting the plant in operation it was found that it was easier to move these than to move the equipment on the trestle and also that the derrick was subject to less vibration when blocked rigidly in position at one point. Consequently the plant is being operated entirely from a fixed position on the trestle with the dumping hopper also fixed in place at the normal boom reach from the derrick platform.

As an adjunct to the overhead plant an auxiliary hoisting engine has been provided in a cabin on the river bank at one end of the trestle to assist the tow boat in making the transfer from the loaded to the unloaded barge and for snubbing the barge up or down stream as it is being unloaded. Oil is used exclusively for fuel for the steam plants, and the plant facilities include a 14,000-gal. oil storage tank which is filled by gravity from the track hopper. There is also a 1,000-gal. tank on a float for delivering oil to the dredge.

The spur from the main line is 22,850 ft. long. Its construction through the flat river bottom lands entailed no particular difficulty, the total grading being 27,000 cu. yd. In addition to the main track this branch embraces a yard at the plant comprising three tracks at the extreme end beyond the loading platform, used as empty tracks and two tracks on the near side of the plant, used as load tracks. The empty tracks are on a one per cent grade so that cars may



Track Layout at the Ballast Plant

be dropped back to the loading plant as needed and from which they are dropped down on a 0.7 per cent grade into the load tracks as they are loaded.

Provide Model Camp

As the plant is virtually isolated from any settled community it was necessary to establish a high-grade camp at the site which not only affords satisfactory housing for the plant employees but accommodations as well for the work train crews that tie up overnight. The camp includes individual houses for the families of the married men, a bunk house for single men and a boarding house and commissary, foreman's office, etc. To insure a high quality of the meals the boarding house and commissary are operated by the dining car department of the railroad and excellent meals are served at 35 cents each. In the absence of any

school accessible to the children of the employees, the railroad has provided a passenger coach to serve as a schoolhouse and the men with children pay the wife of one of their number to serve as a teacher. A Delco lighting plant has been installed for lighting the camp, buildings and loading plant and a similar plant supplied by Fairbanks, Morse & Company has been installed on the dredge.

The Plan of Operation

Under the plan of operation followed the dredge is moored against the bank or bar and loads a barge lashed alongside, while another barge is being unloaded into cars at the shore plant. In the meantime, a third barge is being transferred from the dredge to the unloader or vice versa. The dredge is normally operated in a downstream direction so that the cut face of the bar, which is made as nearly vertical as possible, faces upstream and will tend to catch a new deposit of gravel during every high water period.

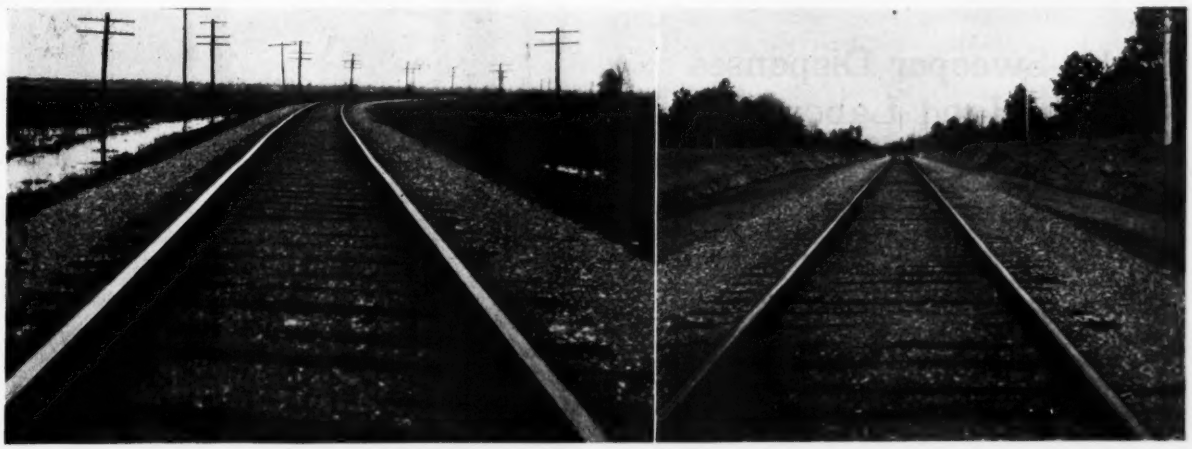
The force employed at the plant is as follows:

1 foreman.
1 derrick operator on the shore derrick.
1 fireman on the shore derrick.
1 car rider.
1 dockman to assist in landing barges.
1 man to pinch cars.
1 man to wind up doors.
1 man to spot cars.
1 car inspector.
1 hoist operator to control the barge at the dock.
1 dredge operator.
1 dredge fireman.
3 laborers on the dredge.
1 tow boat engineer.
1 pilot.
1 telegraph operator and clerk.
1 night watchman.

In addition to this organization the operation of the ballast plant is charged with the maintenance of the ballast spur which requires the employment of a foreman and four men. The organization at the plant will normally load 44 cars or 1,450 cu. yd. of ballast per 10-hour day.

The ballast from this plant is being used in a general improvement program covering the main line of the Cotton Belt, Northern division, from Paragould to Texarkana, a distance of 315 miles, the Shreveport line, 53 miles, and several branches of the division which have not been ballasted for about 16 years. After this program is completed it is expected to use the ballast on a portion of the Texas lines.

The program includes the widening of embankments to a 20 ft. roadbed with an allowance for shrinkage, and a corresponding increase in the width of cuts, so as to permit the application of 1,800 cu. yd. of ballast per mile with five inches under the ties and a 2 to 1 slope from a point 12 in. out from the ends of the ties. The bank widening is done under two different plans of operation, depending upon the amount of work required. Where the work is relatively light it is being done with teams by force account under a foreman in the employ of the railroad. At certain times of the year teams can be employed locally at 50 cents per hour. The bank widening with teams is generally done from borrow and the ditching and widening of cuts by wasting on top. Where the work is heavier the banks are widened with stripping purchased from a commercial gravel pit at 15 cents per yard and delivered by train haul.



Track on the Cotton Belt Ballasted with Ouachita River Gravel

The ballasting is done with a force averaging 210 men, divided into four gangs. One gang of 65 men "skeletonizes" the track at the rate of about a mile a day. This is followed by a second gang of equal size which unloads the ballast and makes the first lift. Two other gangs of 45 men each make the final raise and do the dressing and lining.

The authority for the new ballast plant included the purchase of 200 side and center dump cars of 100,000 lb. capacity from the American Car & Foundry Company. With gravel weighing 3,200 lb. per cu. yd. these cars have a capacity of 33 yd. each. The ballast is handled by work trains of 21 cars each for a single engine or 40 cars for a double-header, these loads representing the tonnage rating for the classes of locomotives used in this service on the one per cent ruling grade which prevails against both northbound and southbound traffic between Pine Bluff and Texarkana. This plan is modified to some extent in delivering ballast to portions of the distance between Camden and Pine Bluff where more favorable grades make it possible for the work train to fill out to a larger tonnage with cars handled from Camden to intermediate points in regular revenue trains.

The Progress Made

When the plant was completed in 1923 it was decided to start the ballasting in the 130 miles between Keevil, Ark., Mile 207, and Camden, Mile 338, and work was completed on 20 miles during that year. No work was done during January and February, 1924,

on account of floods in the Ouachita river, but as soon as conditions permitted, operations were started and by the end of the year, work had been completed from Keevil to Stephens, a distance of 150 miles, of which 130 miles represents the first full season's operations. The plant represents an investment of $125,000, which forms the basis of a charge of 15 cents for depreciation allocated to each yard of gravel loaded. In addition to this the railroad must pay the state a royalty of five cents per cubic yard.

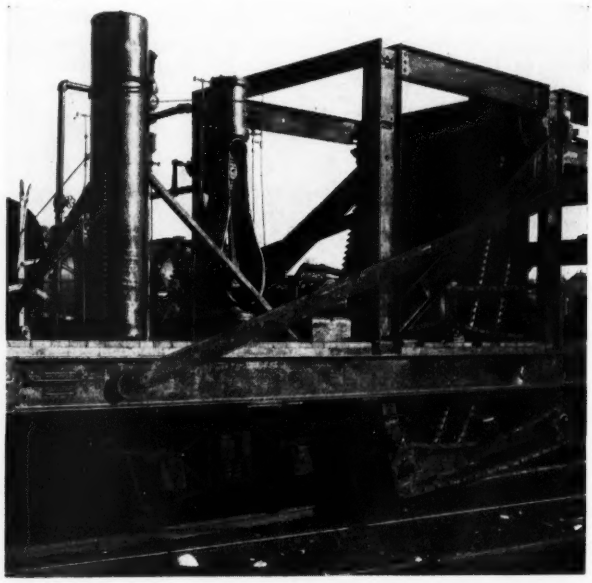
The operation of the plant and the transportation of the ballast is under the direction of T. M. Hutson, assistant superintendent, Pine Bluff, Ark., the ballasting being conducted in co-operation with J. F. McCurdy, division engineer, and the roadmasters on whose subdivisions the work is being carried out. The entire operation is under the supervision of C. B. Petticrew, superintendent, Pine Bluff, Ark., and W. S. Hanley, chief engineer, Tyler, Texas.

Cinder Sweeper Dispenses With Hand Labor Methods

THAT DEFINITE progress is being made in the development of mechanical equipment capable of saving much of the money that is being spent on hand labor for removing cinders from track and thereby permitting this labor to be expended on other work is suggested by the recent introduction of two power sweepers on the Baltimore & Ohio. These machines clear the tracks down to the top of ties and over their full length and also discharge the cinders into a car for removal elsewhere.

The sweeping is accomplished by means of a circular brush of steel wire, 37-in. in diameter, which is suspended from a structural steel framework below the car and just ahead of the rear trucks, a position which is important in order to keep the brush in line with the track while on curves. This brush is revolved in the forward direction by means of link chains running from sprockets which are driven by two vertical type steam shovel engines installed on the rear of the car directly over the rear trucks, which engines also furnish the power for driving the conveyor machinery. The latter consists of an apron fitted with angle irons which catch the cinders discharged upon it by the brush and carry them up an incline to horizontally supported conveyor belts on which the cinders are dragged to a considerable distance beyond the forward end of the track sweeper where they are deposited in a car. A feature of this drag conveyor is the presence of small drop doors in the bottom of the trough at intervals of about five feet from center to center. These drop doors are left open when sweeping and provide a method of loading a car uniformly over the full length without requiring any shoveling of the sweepings.

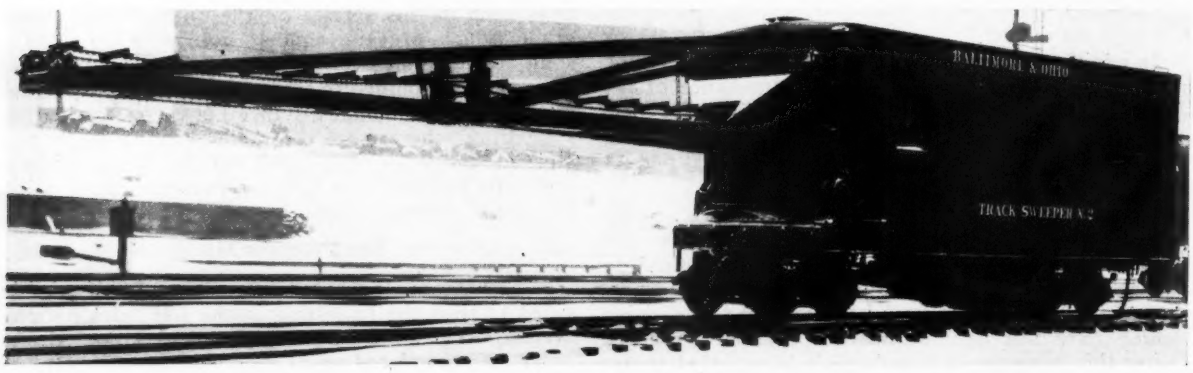
Two old steam shovel cars having 15 in. I-beams for sills were used in the construction of these sweepers. These cars are 10 ft. wide and 36 ft. long. At a point where the conveyor apron passes up through the floor of each car two of the I-beams were cut out for a distance of four feet and one additional beam was placed close to the outside beam on each side of the car for reinforcing, after which heavy I-beams were riveted crosswise of the car to support the ends of the



A Side View of the Sweeper Before the Cab was Built Showing the Revolving Brush, the Stationary Engine and the Cinder Elevator

two beams that were cut off. This left a hole through the bottom of each car 4 ft. long and 8 ft. 6 in. wide which provides space for the apron conveyor to pass through freely. In other respects the cars are similar in dimensions to the typical flat car.

As indicated by the use of steam engines, each machine is operated entirely by steam power, which is furnished from a work train locomotive. Only one man is necessary for operation. That the machine embodies large possibilities as a labor saving device in the maintenance of way field is indicated by the results of a recent test where waste sand and cinders were



A Side View of the Track Sweeper Showing the Outfit in Condition for Shipment

shoveled into the center of a track until the brake beams of cars leveled them down ahead of the sweeper. One of the sweepers cleaned this track thoroughly, loading a gondola car of 115,000 lb. capacity in 20 min. The forward movement of the sweeper in this test was slow on account of the heavy accumulation, the progress being limited to about two miles an hour, but on track where the accumulation is lighter, it is claimed that a speed of four to six miles per hour can be maintained with satisfactory results. The sweepers were designed and built under the direction of S. C. Tanner, superintendent of maintenance of way shops, Baltimore & Ohio, Martinsburg, W. Va., to whom we are indebted for the above information.

Sweet Clover Planted In "Sand Blows" Reduces Drifting

By H. R. Clarke
General Inspector of Permanent Way, Chicago, Burlington & Quincy, Chicago

BLOWING and drifting sand has proved both troublesome and expensive on certain parts of the Western lines of the Chicago, Burlington & Quincy. In many places, the quantity of sand that blows on the track is small so that the condition is not serious. The harm done and the expense incurred are due largely to the fact that the sand, blowing into and mixing with the ballast, in time leads to its deterioration to such an extent that the maintenance of the track to the desired standard is not possible and it is necessary to renew the ballast. To defer, if possible, the need of such renewal and counteract the damage to some extent, efforts have been made, based on considerable study, to use the kind of ballast which will give the longest service under the conditions that exist. In other places the trouble is more acute. Where this is the case the sand not only damages the ballast but blows on the track in sufficient quantity to fill both surface and cut ditches and often piles up on the track, making frequent removal necessary.

Fig. 1.—Sand From the Blow Fouled the Track in the Cut

The location and seriousness of these troublesome conditions are subject to change. Spots which were once the source of constant watchfulness and expense have "haired" over with native vegetation and are now forgotten. To offset these, new spots have developed. A "blow" is sometimes started by injudicious ditching or other work on the right-of-way. Occasionally a too ambitious rancher will try to raise corn on land not intended for such use by nature.

Sand Fences Not Often Satisfactory

As on many other roads efforts have been made to check the sand with sand fences, but this has not often proved very satisfactory. At best the fence is expensive and when, as is usually the case, the sand blows not only off the sides of the cut but in from the land outside the right-of-way, the sand fence is of little benefit. Holding the sand with native vegetation, the growth of which is encouraged in every way, has also been tried but in the places where the trouble is most severe volunteer vegetation will not grow owing to the character of the soil, or rather sand, and the extreme aridity. An experiment is under way with Russian olive trees but only on a small scale and several years will be required to demonstrate what may be expected from this expedient.

Efforts have been made from time to time to overcome a number of these troublesome sand blows on the Lincoln-Billings line of the Burlington, some of which have caused trouble and expense ever since the line was built, but until recently these afforded little relief. Greater promise of success is offered by an experiment now being made with sweet clover in accordance with a suggestion made by J. D. Ream, a farmer living near Broken Bow, Neb., and F. G. Gurley, superintendent of the Alliance division. Mr. Ream is thoroughly familiar with the sand hills and knew from his own experience that sweet clover could be grown in them, even on a "blow out."

Fig. 2.—View at the Same Location as in Fig. 1 on August 20 After One Season's Growth of the Sweet Clover. The Sand in the Foreground Is a Cow Path Where Clover Did Not Have a Chance to Grow

One of the most troublesome spots, about two miles west of Thedford, Neb., was selected for the test. Here the sand "blow out" was adjacent to the right-of-way on land belonging to H. E. Milroy of Thomas county. The continual blow of sand on and over the track had been a constant source of danger from pos-

sible derailments and a matter of expense in keeping the track and ditches clear. During certain seasons of the year it was necessary to shovel sand from the rails during the night as well as during the day.

Mr. Milroy was interested and his co-operation secured. Val Kuska, colonization agent and Mr. Taylor, Denver representative of the agricultural agent, were consulted and their conclusions confirmed Mr. Ream's contention that sweet clover promised the best results. This plant is vigorous, makes a rank growth and the roots strike deep and also spread in a way that binds and holds the sand. It was believed that the sweet clover would cover the ground and prevent the sand drifting if a growth could once be started.

Fertilizer Was Necessary

The "blow out" was a bad one and it was obvious that the seed could not be sown on the white sand alone. Some covering was necessary to afford the clover seed a chance to grow. To furnish the necessary fertility, create a mulch which would tend to hold moisture and form a covering to prevent the sand blowing while the plant growth was starting, the ground was covered with manure containing considerable straw before sowing the clover seed. The area of the "blow out" was about 30 acres and required about 17 carloads of manure, which was secured from the cleaning of stock cars. It also required 200 lb. of seed.

The seed cost $28 and the labor of unloading the manure amounted to $250. As the cleaning of stock cars and the hauling of manure from stock yards is work that must be done somewhere, the additional expense incurred in doing it at this particular location was not great. The rancher co-operated in furnishing teams to do the hauling and spreading.

Fig. 3—How the Sand Drifted Against the Right-of-Way Fences

Two results were hoped for: First, that the growth would hold the sand and thus protect the track; second, that it would demonstrate that sweet clover, a splendid forage crop, could be grown successfully and at a small expense in these sand hills where additional pasturage is needed. Those in charge of the experiment are satisfied with the progress made and feel that it has demonstrated that both of these objects may be attained in this way.

The groups of photographs showing views taken in practically the same locations give a fair idea of the comparative conditions in April just before the seed was sown and in August after a season's growth. No trouble has been experienced with this project. The manure prevented drifting till vegetation started and the growth was heavy and vigorous enough to hold the sand afterward.

More Time Required

The experiment has not yet run long enough to be pronounced 100 per cent successful. In fact, some conditions have been unfavorable. The start was made rather late in the season—after all the snow had melted and the entire year was very dry. If the seed had been sown on the snow a much better growth would have been secured.

It has been planned to add a little more manure to a few bad spots and sow another 200 lb. of the sweet clover seed. The vegetation is dead in the winter but

Fig. 4.—View on August 20 in the Same Location as That Shown in Fig. 3. A Considerable Number of Weeds Are Mixed with the Clover

the matted stalks of the heavy growth covering the ground will serve to hold the sand during the winter. The vegetation shown in the pictures taken on August 20 is not all sweet clover, part of it being weeds growing from the manure. This is causing no anxiety and no difficulties are anticipated as experience has shown that sweet clover, once started, will soon kill out weeds. The sweet clover plants in the growth were plentiful and healthy. Precautions are being taken to prevent fires starting from locomotive sparks or other causes destroying the protective mat of dry vegetation and thus possibly harm future growth.

An 18-in. Creosoted Pipe Culvert with Dry Stone Parapets Constructed in 1897

The Piers Were Completed Before the Old Steel Viaduct Was Removed

Pennsylvania Engineers Design Concrete Mixtures*

Find Scientific Methods Both Practicable and Profitable on Large Bridge at Pittsburgh

By T. P. Watson
Assistant Engineer, Pennsylvania System, Pittsburgh, Pa.

THE PENNSYLVANIA recently completed a bridge of unusual character at Pittsburgh which carries the Monongahela River line of the railroad over the valley of Beck's run. The old structure consisted of two parallel double-track steel viaducts and was replaced by a five-track bridge consisting of 13 concrete girder spans and one steel girder span. The concrete spans are 40 ft. long center to center of the reinforced concrete bents or open piers on which they are supported. Each span comprises five concrete girders 7 ft. 6 in. deep by 3 ft. 9 in. wide, spaced 13 ft. 6 in. center to center and connected at their ends by concrete diaphragms 6 ft. 3 in. deep by 12 in. thick. The girders serve as the support for a continuous concrete slab floor averaging 18½ in. thick which provides the roadbed for the tracks.

The construction of this bridge was accomplished by discontinuing traffic on two tracks of the old structure from which the new piers were built complete. The viaduct supporting these two abandoned tracks was then razed and three concrete girders and one-half of the concrete slab were completed. Traffic was then transferred to two tracks on the new structure after which the other old viaduct was razed and the second half of the bridge was completed. The first concrete was placed on May 20, 1924, and the last pour was made on January 3, 1925, completing the structure.

The work included 5,000 cu. yd. of foundation concrete and 10,000 cu. yd. of reinforced concrete. The contract for the construction of this bridge was let, after competitive bidding, on the basis of unit prices for each unit of work.

All the concrete in this structure was designed for a definite strength, using the theory of design of concrete mixtures developed by Duff Abrams, professor in charge of the Structural Materials Research Laboratory, at Lewis Institute, Chicago. Our first experience in designing concrete mixtures was very unsatisfactory as we had no knowledge whatever of the procedure to follow when we commenced this project. The reason for the unsatisfactory results was that we were using methods of our own in making our determination. As soon as we adopted and became acquainted with the methods for the "Standard Tests for Concrete and Concrete Aggregates" as set forth by the American Society of Testing Materials we obtained striking results.

Follow Structural Materials Bulletins

We used as a basis of our mixtures Bulletin 1 and Bulletin 9 of the Structural Materials Research Laboratory. Bulletin 1 is a treatise on the design of concrete mixtures by Professor Abrams and Bulletin 9 is a compilation of tables of proportions for various concrete mixtures for different strengths, using various slumps and differing sizes of fine and coarse aggregates.

The proportions are given in terms of a unit of cement to units of dry rodded sand and coarse aggregates. Sand and gravel loose and moist, as they were placed in the concrete mixer, on our work contained various percentages of moisture and bulked accord-

*Abstracted from a paper presented before the Philadelphia Section of the American Society of Engineers.

ingly. This was especially true of the sand so that in order to have uniform amounts of sand in our concrete mixtures it was essential to make determinations of the ratio of the volume of the loose materials to the volume of dry rodded materials.

Study Samples of Sand and Gravel

The first procedure was to obtain representative samples of the sand and gravel to be used in the concrete and to determine the moisture content and the bulking of each. For these determinations we used a cylindrical metal receptacle with a capacity of ½ cu. ft. We filled this with the sample of loose sand and weighed it. We then dried this sand and weighed it. The difference in the weight of the moist sand and the dry sand was the weight of the moisture content. We then filled the receptacle with dry sand in three equal layers, rodding each layer 25 times with a ¾-in. tamping rod and levelled off the top of the sand with the fingers. By dividing the weight of the dry rodded sand in the full receptacle by the weight of the dry sand of our sample, we had determined the ratio of bulking of the loose moist sand to a unit of sand, dry and rodded.

Receptacle full of moist and loose sand.....Weight 43.7 lb.
Same sand as above, dry.....Weight 40.8 lb.

Moisture 2.9 lb.

$\frac{2.9}{40.8}$ = 7 per cent, the percentage of moisture to dry sand.

Receptacle full of dry rodded sand.....Weight 51 lb.

Bulking = $\frac{51}{40.8}$ = 125 per cent, the volume of moist loose sand to a unit of sand, dry and rodded.

The same procedure was followed in determining the moisture in the gravel and its bulking. By a series of bulking tests of Pittsburgh gravel of varying sizes we found that the gravel bulks 8 per cent or, for our purposes, we considered 108 per cent as constant, the volume of loose gravel to a unit of gravel dry and rodded.

Make Sieve Analysis

We next made a sieve analysis of the sand and gravel separately, using a set of United States standard square mesh sieves whose sizes are 100, 50, 30, 16, 8 and 4 per linear inch and ⅜ in., ¾ in., 1½ in. and 3 in. We used a 50-oz. sample of the dried sand and a 100-oz. sample of the dry gravel in making the sieve analysis. The percentage of the particles of the aggregates by weight retained on each sieve was obtained and the sum of these percentages divided by 100 gave us what is termed the "Fineness Modulus."

To illustrate assume that the sieve analysis of the sand and gravel were as follows:

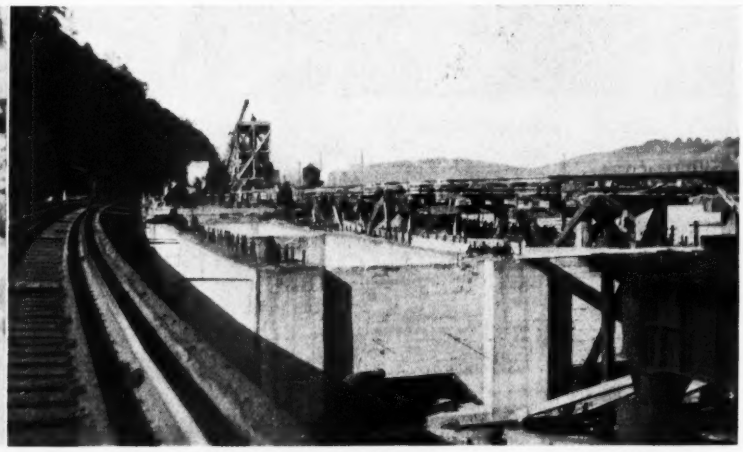
Size of sieve	100	50	30	16	8	4	⅜	¾	1½	3	Fineness Modulus
Sand	99	88	30	15	8	1	0	0	0	0	2.41
Gravel	100	99.8	99.5	99.2	98.5	91	63.5	28	0	0	6.80

We now have determined the following:

Bulking of loose sand.....125 per cent
Bulking of loose gravel.....108 per cent
Fineness Modulus of sand.....2.41
Fineness Modulus of gravel.....6.80
Size of sand.....0 to No. 8
Size of gravel.....No. 4 to 1 in.

The above size classification of aggregates is arbitrary and is determined from the sieve analysis under a rule which provides that at least 15 per cent shall be retained on the sieve next smaller than that considered the maximum size and not more than 15 per cent of a coarse aggregate shall be finer than the sieve considered as the minimum size.

A View of Some Four-Inch Slump Concrete



A General View Showing the Arrangement of the Concrete Girders and the Diaphragms Connecting Them

The Amount of Water

We now have sufficient data to design concrete of any strength desired with the very important exception of the water required, which element will be taken up later. The next step was to decide on the workability or plasticity of the concrete required for the particular part of the structure to be poured. In other words, workability or plasticity should mean the use of the driest concrete possible consistent with common sense.

At Beck's Run we used the following consistencies and obtained excellent results, the measure of consistency being the slump test. For gravity sections where it was possible for men to be in the forms we used a slump of three inches. For reinforced concrete where it was not possible for men to be in the forms but where it was possible for men to puddle the concrete with long handled hoes and paddles we used a four-inch slump. For reinforced concrete where it was impossible for men to be in the forms and impossible to reach the concrete with any practical puddling device we used a six-inch slump.

Our gaging of water by the slump tests, using Pittsburgh river sand and gravel to a maximum size of two inches, has been checked against the theoretical amount of water (in accordance with Bulletin 1) and

we have found that the water content as determined by the slump test was almost exactly the same as the theoretical water content. I do not think, however, that the same results could be obtained when using a larger gravel aggregate and I also think that a slightly different result would be obtained by using broken stone for coarse aggregate, but there is no reason why these differences cannot be worked out to cover each local condition.

Obtaining the Desired Strength

We then determined how to obtain the strength required. To illustrate we will assume that we are pouring a concrete girder calling for 3000 lb. concrete and that we will use a four-inch slump.

We have found by the sieve test that the sand size was 0 to No. 8 and the gravel size No. 4 to one inch. By referring to the tables in Bulletin 9 for 3000-lb. concrete, we find under fine aggregate size 0 to No. 8 and coarse aggregate size No. 4 to one inch for a three to four-inch slump, a proportion of 1 cu. ft. of cement (one sack) to 1.2 cu. ft. of sand, dry and rodded, and 2.6 cu. ft. of coarse aggregate, dry and rodded. This proportion with the proper amount of water could be used if it were not for certain necessary corrections which will be explained later.

The Abrams theory of mix is based on what is termed the True Mix, or the proportion between a cubic foot of cement (one sack) and units of dry sand and dry coarse aggregates combined and rodded. If we combine and thoroughly mix the 1.2 cu. ft. of sand and the 2.6 cu. ft. of gravel of our example and place them in a receptacle, the resultant volume will be less than the volume of the two aggregates measured separately, as the sand will fill in the voids in the coarse aggregate. From the results of a series of determinations using the Pittsburgh aggregates in varying proportions we found that the volume of the combined aggregates was 86 per cent of the volume of separated units of sand and gravel. Therefore the True Mix of our example would be the proportion of one cubic foot of cement (one sack) to 86 per cent of the sum of 1.2 and 2.6 or 3.268. The True Mix then is 1 cu. ft. of cement to 3.3 cu. ft. of combined sand and gravel, dry and rodded. The operations to obtain this result are as follows:

1 cu. ft. of sand, dry and rodded.....Weight 102 lb.
1 cu. ft. of gravel, dry and rodded.....Weight 102 lb.
The True Mix selected from the table was 1:1.2:2.6.
1.2 cu. ft. of sand dry and rodded at 102 lb.=.....122.4 lb.
2.6 cu. ft. of gravel dry and rodded at 102 lb.=.....265.2 lb.

3.8 cu. ft. of sand and gravel separated=.....387.6 lb.

$\frac{1.2}{3.8}$=32 per cent, the percentage of sand in the mix.

1 cu. ft. of a mixture of aggregate dry and rodded containing 32 per cent of sand and 68 per cent of gravel as explained below=.....120.0 lb.

3.8×120 lb.=456.0 lb.=weight of 3.8 cu. ft. of combined aggregates.

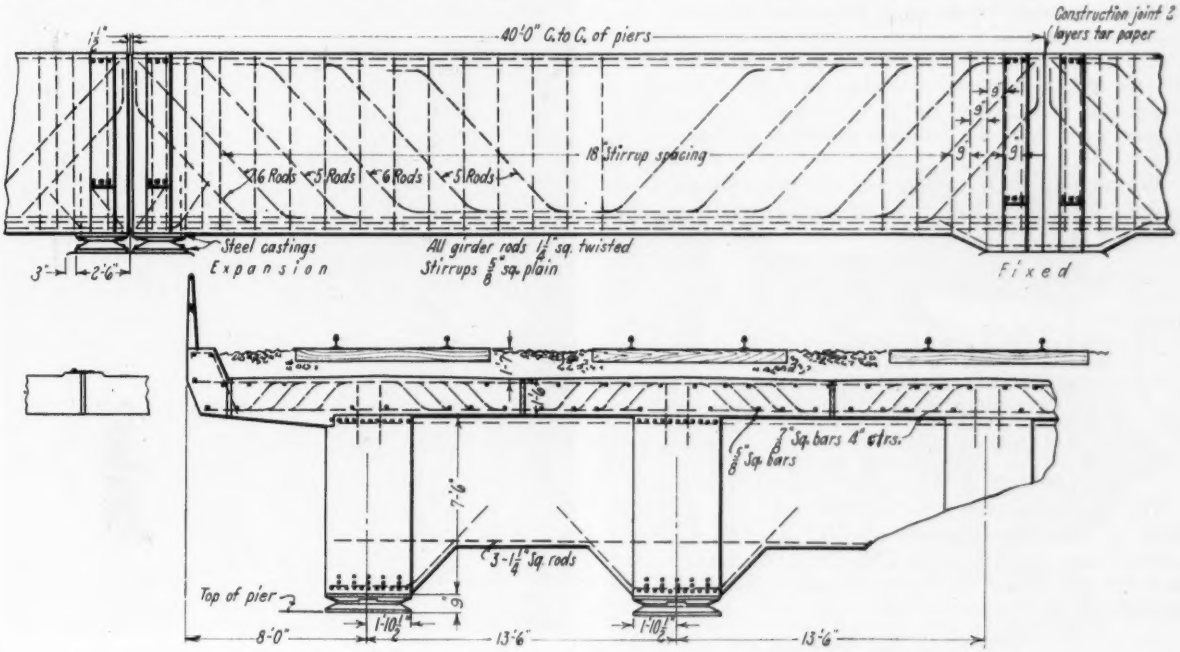
$\frac{387.6}{456.0}$=86 per cent, the yield.

The True Mix equals 3.8×.86=3.268 cu. ft. of combined dry and rodded aggregates to 1 sack of cement (1 cu ft.) or a true of 1:3.3.

To facilitate these operations we made a series of tests and determined the average weight of a cubic foot of sand dry and rodded and a cubic foot of gravel dry and rodded. We then made determinations for the weights of a cubic foot of mixtures of sand and gravel dry and rodded. This we did by making mixtures of 10 per cent sand and 90 per cent gravel, 20 per cent sand and 80 per cent gravel, 30 per cent sand and 70 per cent gravel, 40 per cent sand and 60 per cent gravel, etc., and ascertained the unit weights of each mixture dry and rodded. Having these unit weights the determination of the yield is very simple.

Unit weights should be determined of aggregates from each general source of supply as the aggregates from different sections of the country have varying properties peculiar to themselves and their weights are liable to be quite different.

As stated above, certain necessary corrections must be made to the proportions taken from the table in Bulletin 9. The reason for these corrections were:



Details of the 40-ft. Reinforced Concrete Girders and the Track Slabs

(1) That the grading of gravel received on the work was so variable that it was necessary actually to design a mixture for each carload of aggregate used in order to get uniform concrete.

(2) The Pittsburgh district gravel contains a large portion of flat particles and in order to secure the proper amount of mortar in the concrete it was necessary to increase the sand slightly and decrease the quantity of gravel.

Table 3 in Bulletin 1 gives "Maximum Permissible Values of Fineness Modulus of Aggregates," together with corrections for various materials and states "that for pebbles consisting of flat particles reduce the values shown in Table 3 by 0.25." We obtained very satisfactory results by following this suggestion.

Correcting for the Presence of Flat Particles

Earlier in the design of the mixtures we found the True Mix to be 1 to 3.3 and by the sieve test that the maximum size of the aggregate was one inch, so that the size of the combined mixture of sand and gravel would be from 0 to one inch.

Bulletin 1, Table 3, gives values of the fineness modulus suitable for an aggregate sized from 0 to one inch and a mix of 1 to 3 to be 5.90 and for a mix of 1 to 4 to be 5.60. By interpolating for a mix of 1 to 3.3 we get a fineness modulus of 5.81. Making a deduction of 0.25 for the flat particles as explained before we obtain the fineness modulus of our mix of 5.56.

We now are ready to correct our proportions. This is done by using a formula and the aggregates of our example as follows:

$$P = 100\frac{A-B}{A-C}$$

Where—

P=percentage of fine aggregates in the total mix.
A=fineness modulus of coarse aggregate (6.80).
B=fineness modulus of final aggregate mixture (5.56).
C=fineness modulus of fine aggregate (2.41).

Or—

$$P = 100\frac{6.80-5.56}{6.80-2.41} = 28$$ per cent, the percentage of sand in the total mixture.

We found that the total mixture was 1.2 and 2.6 to make a True Mixture of 1 to 3.3. Therefore 28 per cent of the sum of 1.2 plus 2.6 gives 1.06 cu. ft. of sand and the difference between 1.06 and 3.08 is 2.74, the volume of the gravel.

Correction for Bulking

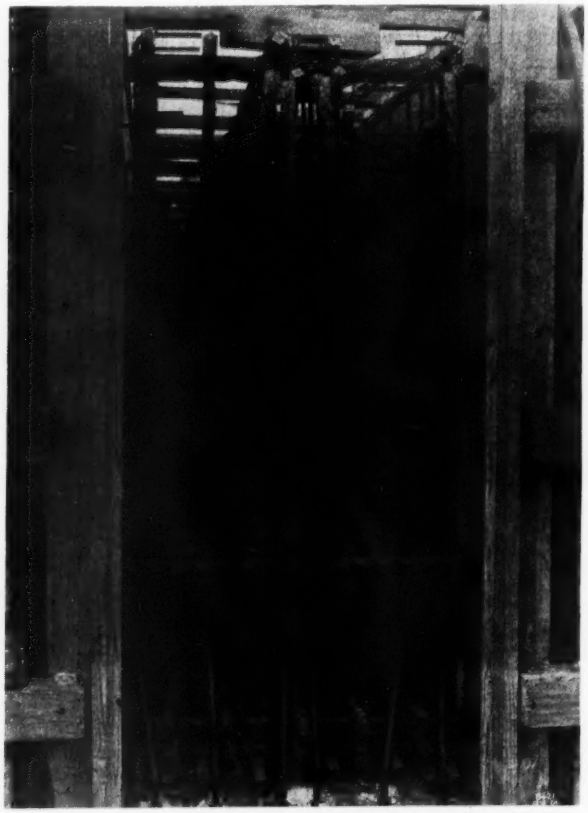
We now have the proportion of 1 cu. ft. of cement to 1.06 cu. ft. of sand and 2.74 cu. ft. of gravel, but it is still necessary to take another step to determine what volumes of loose material we are to place in the mixture, as the proportions 1.06 cu. ft. of sand and 2.74 cu. ft. of gravel are for volumes dry and rodded.

The first determinations showed that the sand loose bulked 125 per cent and the gravel loose bulked 108 per cent; therefore by multiplying 1.06 by 125 per cent we obtain 1.33 cu. ft. of loose sand and by multiplying 2.74 by 108 per cent we obtain 2.95 cu. ft. of loose gravel.

We now have the proportions of the volumes of cement and aggregates to place in the concrete mixer to be one sack of cement, 1.33 cu. ft. of loose sand and 2.95 cu. ft. of loose gravel. Knowing these proportions the size of the batch is determined by the capacity of the mixer.

These proportions would make 3000-lb. concrete *providing* the last and one of the most important ingredients is added in the proper quantity. Water has been used in making concrete of varying kinds and this means *varying* with all the extremes that this word implies.

The water was gaged entirely by the slump test. This was done by assuming that an estimated amount of water would give the desired slump when we started in the morning and we would make at least two slump tests to check up our estimated water content. If these slumps were about four inches we then placed the same amount of water in each batch. Throughout the day if nothing unusual developed in the working of the concrete we would make four or five additional slump tests to check the water. If our inspector noted any change in the concrete, that is, if it appeared too wet or too dry he immediately made



Concrete With a Four-Inch Slump Was Readily Placed Around the Heavy Reinforcement of the Girders

slump tests to cut down the water if the slumps were running over four inches or to add additional water if the slump was under four inches.

This may seem a rather crude method of controlling so important an element as the water content but all of the concrete in this structure was placed by this method and we feel that the results obtained warrant our continuing this practice until some more accurate practical method of measuring water is devised that will automatically take care of the varying moisture contents in the aggregates.

There are a few more essential points in connection with the placing of concrete at the Beck's Run bridge.

Two minutes actual mixing time was required after all the ingredients were in the mixer.

Chuting was not permitted except directly in the forms.

All horizontal surfaces were covered with three inches of sand as soon as the concrete had set sufficiently to permit

it and the sand was kept moist by sprinkling it twice daily to help the proper curing of the concrete.

All the cement used on the work was furnished by the railroad and was tested for 28-day strength before it was shipped from the cement mill.

A colorimetric test of all sand used was made in accordance with the Standard Method of Test for Organic Impurities in Sand and Concrete of the American Society of Testing Materials.

The mixer was in good physical condition.

An accurate batching device was provided for measuring the sand and gravel placed in each batch.

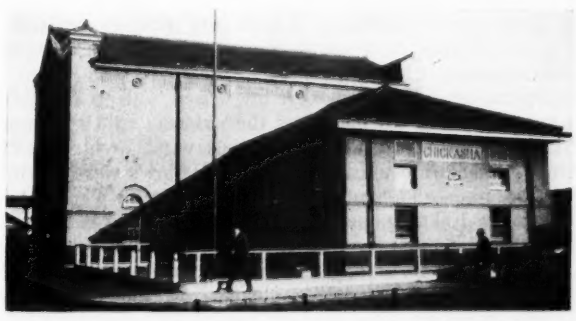
An accurate measurement was made of the water added to each batch.

The contract for this work was let before we knew anything about "Fineness Modulus" and I do not think that the carrying on of this method of making con-

View of One Side of the Structure Just After the Falsework Had Been Struck

crete in any way increased the contractor's expense; in fact, the knowledge that we were striving for something better than usual permeated the whole organization and we have had an unusually smooth running job. Last, but by no means least, we had excellent inspection and a very efficient field corps, all members of which were interested in the work.

This project was designed and constructed by the engineering department of the Pennsylvania under the direction of A. C. Shand, chief engineer, George Nauman, assistant to the chief engineer, and the writer as engineer in direct charge. M. J. McMenamin was the contractor.

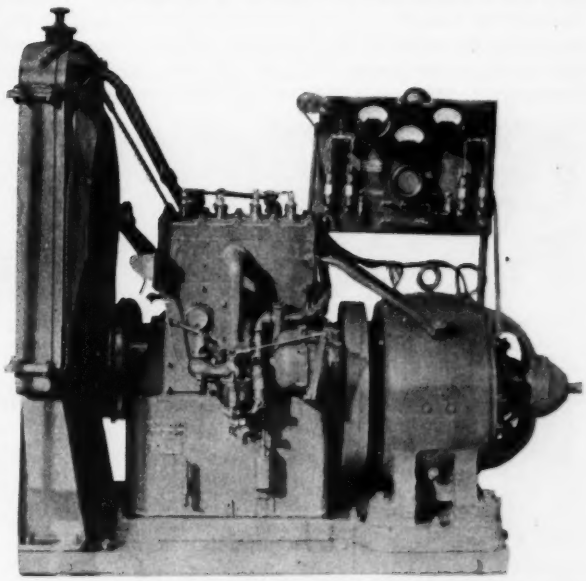


The Rock Island's Station at Chickasha, Okla.

Portable Lighting Outfits For Tunnel Repair Gangs

THE EMPLOYMENT of a considerable year-round force in the maintenance and re-lining of tunnels on the Southern Pacific, Pacific System, is constantly imposing the problem of lighting the tunnels in which work is in progress. The use of oil lamps or torches not only affords poor light, but imposes a considerable fire risk, especially when the lights are used behind the lagging. For this reason several years ago the railroad provided the gangs employed on the larger work with electric lighting generator outfits, usually operated by gas engines and owing to the satisfactory results which were obtained with this equipment, is now equipping all of the tunnel repair gangs with portable generator sets. It is expected that this will do away with all fire risks due to tunnel repair work.

The generating outfits are not all of the same make, but in general they consist of self-contained units of five kilowatt capacity, direct connected to gasoline engines of suitable horsepower. These outfits are light enough to be handled readily. On the arrival of a repair gang at a tunnel the machine is set up as



One of the Engine Generator Sets Used in Tunnel Lighting Service

near the portal as is convenient, wires are run as far into the tunnel as may be necessary and lights installed.

Brackets for insulators are nailed to the timber posts at a height of about five feet and insulated feed wires are strung from the generator to the site of the work or a little beyond. Lamp sockets are connected to the feed wires about every fifty feet to provide lights for illuminating the way in and out of the tunnel. Near the location of the work, short pieces of conduit with suitable outlet fittings are fastened to the timbering and connected to the feed wires to provide connections for as many extension cords as it may be desirable to plug in.

For general illumination flood lights consisting of 200-watt lamps with suitable reflectors and lenses are furnished, but for work between or back of the timbers, single lamps of 50-watt capacity, mounted in sockets

with lamp guards are provided. Tirex cords of suitable length and mill-type lamps are used. These portable lights can be hung where necessary to give the best lighting of the work and as many such lights as may be desirable are furnished.

Frequently repair work is undertaken at several places in a tunnel and in such cases the main feed wires are run a sufficient distance through the tunnel and connections made at proper points. When the work in a tunnel is completed, the wiring is taken down, but usually the insulator brackets are allowed to remain in place for use whenever work is done in the tunnel.

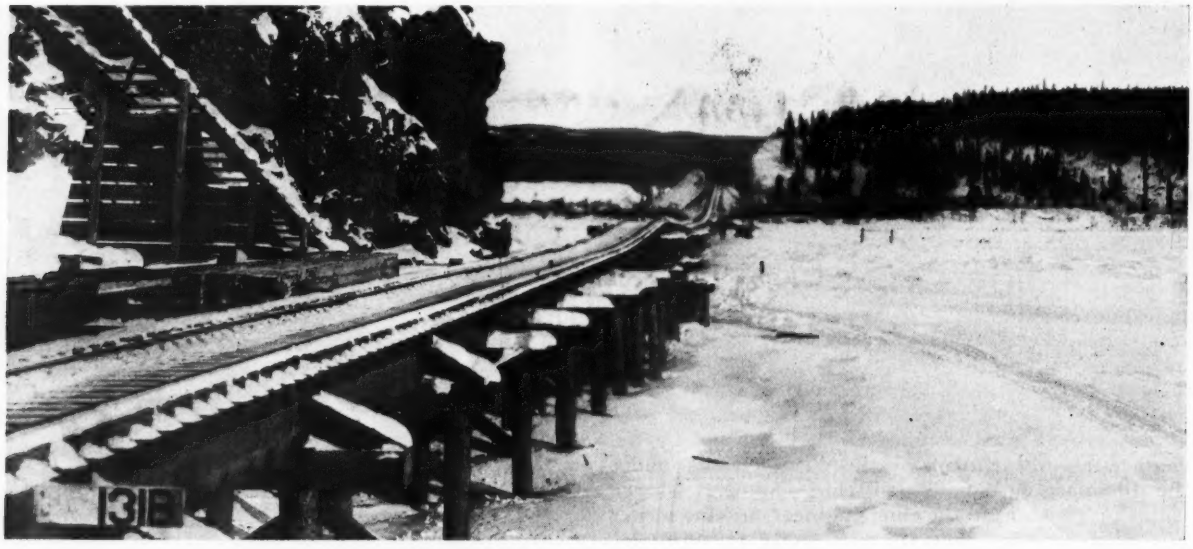
These generating sets require very little attention and are reliable in operation. From the standpoint of cost the use of this system of lighting on small repair jobs may not appear to be justified, but because of the expense and inconvenience caused by fires in tunnels the officers of the railroad feel that every effort to reduce the risk is worth while. We are indebted for the above information to W. H. Kirkbride, engineer maintenance of way and structures, Southern Pacific, Pacific System, San Francisco, Cal.

Keeping A Railway Open Above The Arctic Circle

By L. F. SAUNDERS
Cordova, Alaska

THE CERTAINTY that a bridge carrying the main track over an important river will be carried out by ice between April 27 and May 10 of each year is the problem facing the supervisor of bridges and his superior officers on the Copper River & Northwestern in Alaska. This condition arises because of the fact that the railroad has found it cheaper to reconstruct this bridge each spring than to pay the interest on the investment necessary to erect permanent steel spans.

So well versed in weather conditions is the bridge foreman that trains are run over the structure to within 24 hours of the time the break-up occurs. As many empty cars as possible are collected north of the river and the loaded ones are taken south so that ore shipments by steamer will not be interrupted. Through traffic is generally delayed from 10 to 14 days when the break-up comes, as all of the ice floe must pass down stream before jams go down stream for hours without interruption.



How Ice Pressure Will Buckle a Bridge

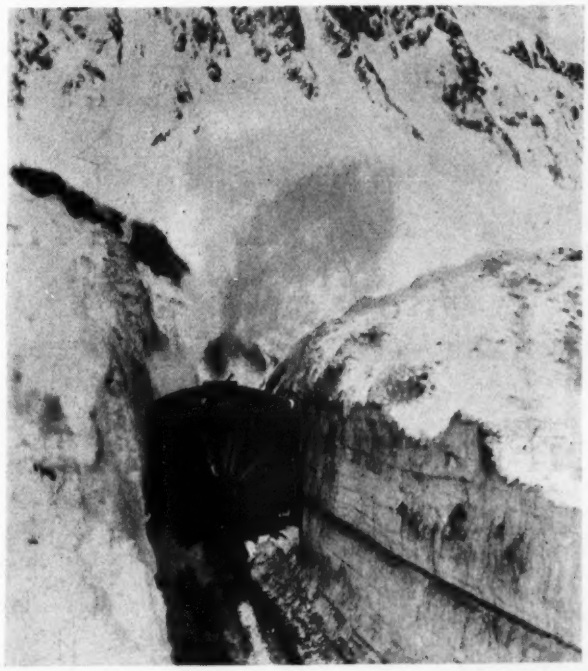
This bridge crosses the Copper river near Chitina, Alaska, 130 miles above the terminus at Cordova. The ice which carries it out extends 100 miles up the river into central Alaska and moves with sufficient force to crush the piling to splinters.

With the extreme cold winter just passed the ice on the river at this point reached a depth of eight feet in place of the usual three or four feet. Early in January the pressure of the enormous amount of ice behind it caused the structure to heave eight inches in the center, a thing which it has not done since 1917. Usually it is only necessary to re-line the tracks as the pilings are forced aside. It was believed that when the break-up occurs this year, the enormous mass of ice floes would carry off every timber in the bridge. Often these ice the actual driving of the piles, which takes only a couple of days, can commence. The record time in replacing the bridge was 29 hours, but that was in a year when only a small portion went out.

Operating difficulties were increased during the past winter by the great length of the extreme cold spell and by the higher and more continuous winds, which often blew 90 miles an hour. Rotary snow plows were started in December and continued through April. The rotary plows ran 100 miles per day, of which 75 miles is through a snow belt. Under the most severe conditions it is found advisable to operate them in both directions on the same day, each rotary clearing 35 miles of snow. These plows go over the line once every day ahead of each train. In a storm they are coupled to the train, as

it is impossible to see the track ahead. The snow frequently drifts in the cut at the rate of a foot an hour to a depth of 10 to 15 feet.

The winter of 1923-24 was the only one in the history of the line when no tie-up occurred due to drifting snow. This year the railroad was not so fortunate and three engines, pushing a rotary when the temperature was 24



Rotary Snow Plow on the Copper River & Northwestern

deg. below zero and the wind was blowing 50 miles an hour, were stalled in the drifts for six days. Snow on the tracks became like ice in the intense cold. As a measure of preparedness, the combination cook and sleeping car carries 30 days' provisions for the crew and was thus able to take care of them adequately until they are dug out again.

There is always danger of something on the engine freezing. Although the power reverse gears and the rotary scoop wheel are equipped with thawing apparatus, they often freeze. In very cold weather, if an engine stops 15 min. the lubrication is so cold it will not start without help. Engines have come in virutally cakes of ice, with gears and steam feeds frozen.

When the tie-up occurred this year, it happened that the rotary working at the other end of the snow was stalled under freak circumstances and this hampered progress in getting to the buried crew. Two engines pushing a snow plow and another engine drawing a local train had entered a row of covered snow sheds, but the drift of sand and snow had become so deep inside that the rotary threw it back on the sides and it piled beneath the train. In trying to back out the pusher rod on the middle engine broke and the rotary was unable to move in either direction for an entire day.

Track Walkers Keep in Touch with Conditions

Operating the Copper River and Northwestern line involves the maintenance of a squad of weather observers. Track walkers are stationed in cabins every six or eight miles along the snow belt and are required to go over their territory and report by 10 a. m. Meanwhile an early weather report is received at 6 a. m. before the trains leave and by the time the trains reach the snow belt, conditions over every foot of the immediate trackage are known. The track walkers, returning in the afternoon, turn in a general weather report over the entire line at 5 p. m. In this way the officers know how many pusher engines will be needed for the rotaries. Generally two are sent, but sometimes this number is increased to three or four.

Just what the snow means to transportation is shown by the tonnage figures. In the summer a locomotive on a mixed train can pull 1,800 tons, but in the winter this average drops to 700 and sometimes to 200 and 300 tons. Only two trains a week are run in the summer, but this number must be increased during the cold months in order that the steamers may receive their normal quantities of ore at Cordova.

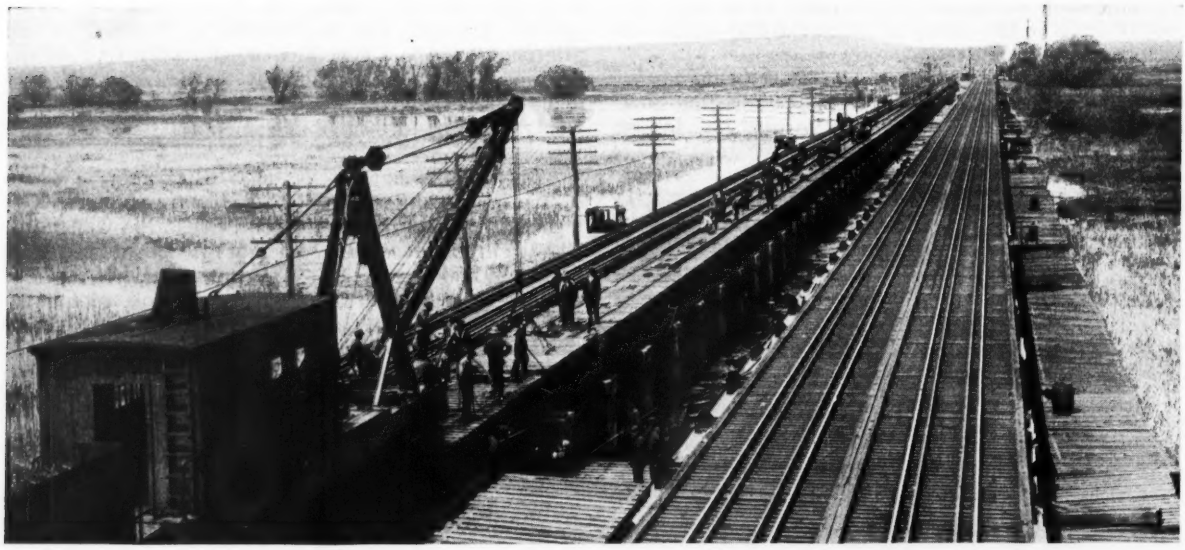
Winter is divided into definite periods on the line. From December 1 to January 30 there is usually cold weather, with snow and a heavy wind. February is the most favorable month because a heavy thaw generally gets under way in the interior. This, however, causes trouble with slides, which range in depth from 15 to 35 ft. Last year the slides totalled 3,500 ft., spread over a 15 mile area, on February 25. This was extraordinarily heavy, as usually there are only 1,500 ft. of slides by that date. Two and a half days were required to clear the tracks. The recent season's unusual cold spell has altered conditions and up to March 4, 1925, not a single slide had occurred.

March generally brings another cold period, with extremely heavy winds on the lower Copper River flats, which the train crosses for 13 miles. Here an unusual condition exists. The rotary cutting through drifts builds a high crust or "slobber" on either side of the cut and this freezes solidly while the wind banks more snow against it. With each trip of the snow plow the procedure is repeated until cuts are built to a height of from 10 to 15 ft. from a natural snow level of 4 or 5 ft. Without any new snow falling the bank has been built from 4 ft. to 12 ft. high. In such a case the snow plow requires two hours to cut through a four mile stretch, whereas it could make the same distance under ordinary conditions in half an hour.

Much fuel and water are necessary and extra large tenders carrying 9,000 gal. of water are brought along.

Tieups Occur Frequently

In extreme cases it has been necessary to siphon water from the pusher engines to the rotary before the work was completed. Such instances occur three or four times a year. Usually in March a storm develops which stops traffic. Two years ago trains laid off a week and when they were once more in operation a rotary worked four days boring through six miles of snow on the flats and consumed 200 tons of coal on the job.



Careful Organizing Enabled the Renewal of This Bridge at a Rapid Rate

Quantity Production in Girder Span Renewal Project

Further Work on New York Central Four-track Structure Results in Record Progress

BY P. H. WINCHESTER,
Division Engineer, New York Central, Syracuse, N. Y.

THE NEW YORK Central recently completed the renewal of three 98-span sections of a four-track bridge over the Seneca river in record time. The plan of procedure which was followed was similar to that employed during 1923 on the renewal of one track across the same bridge and described on page 483 of the December, 1923, issue. The span lengths are 18 ft., and in 1923, they were renewed at the rate of one for each 10½ min. of working time. In 1924, the rate of renewal was increased on each subsequent track, the last track being renewed at the rate of one span every 6¾ min. of working time. In the first work, the track was out of service for a total of 72 hr. and in the last, only 35 hr. The renewal was completed with practically no interference to train operation.

Type of Structure

The four-track main line of this road crosses the Seneca river at the Montezuma marshes, between Syracuse and Lyons, N. Y., on a deck plate girder bridge made up of four separate lines of girder spans, each line being 1,798 ft. in length. The underlying material is a marl deposit of a depth of over 150 ft., so that at the time the original crossing was made a pile foundation was not attempted, the structure being carried by timber mattress three feet in thickness. In order to distribute the load, 97 spans of 18 ft. each were used, with a channel span of 35 ft. for the normal river channel at the west end of the bridge. Originally the piers were of coursed rubble masonry in two lines for the length of the structure, each line of piers carrying two tracks, the two lines of piers being separated by a space of 15 ft. These piers were replaced later by concrete piers, the new masonry being carried on the original mattress.

In 1900, a marked increase in the weight of motive power necessitated changes in the steel, at which time new spans were put in under the two southerly tracks carrying the passenger traffic, the old spans from these tracks being strengthened and used to replace the old spans under the two freight tracks on the north.

From south to north the track are numbered 2, 1, 2, and 4, Nos. 2 and 1 carrying the high speed traffic, westbound trains using the inside tracks. Eastbound traffic through this territory includes a large number of refrigerator cars, so that deterioration from brine action is more noticeable on the eastbound tracks than on the others, and particularly so on the southerly track, No. 2, which carries much of the fast freight. Consequently this, together with the heavier loads of the present day, made necessary the renewal of the spans under track No. 2 in 1923. The further increase in the weight of power in 1924 required the renewal of the steel under the other three tracks.

Methods Used in Renewing Steel

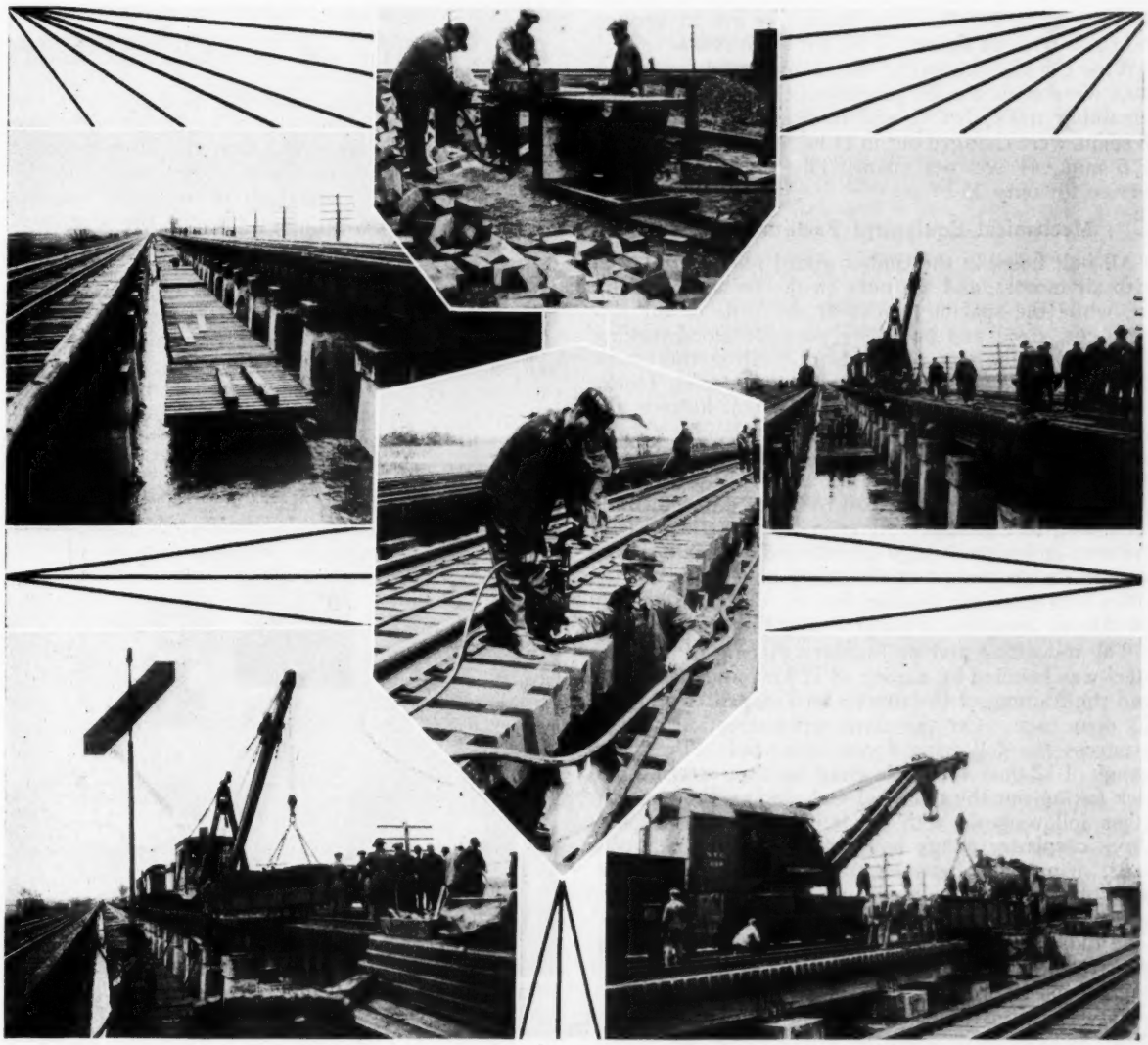
In renewing the steel in 1900 the work was done under traffic, but in 1923 it was decided that the work could be handled more expeditiously by giving up No. 2, or the southerly track across the bridge, during the period of actual erection, a number of temporary track changes being made to prevent interference to traffic. These changes as well as the methods used for changing out the spans were described in the issue mentioned. However, since the methods were substantially the same as those used in the renewal of the re-

maining three sections, a brief outline of them is included here. Prior to the changing out of the steel the new spans were unloaded and placed on cribbing on the south side of the bridge, when the water in the swamp was at normal, low water, summer level. The new deck was framed on the shore east of the bridge site and then placed on the spans.

A 50-ft. boom erecting derrick, headed west, was run out on the bridge from the east end, and work begun with the second span from the west end, the

the jackhammers were started on the anchor bolt holes for the new steel, and the work of placing the outside timber guard rails begun, so that by the time the last new span was in place the track and other work was close behind.

The 98 spans were placed in two days, the total working time being 17 hr., 15 min., or an average per span of 10 min., 55 sec. The track was restored to service 72 hr. after the work of changing out the steel had been started.



Upper Left: The New Spans and Decks Were Framed in Advance. Lower Left: Swinging In One of the Spans, Upper Right: The Work of Finishing Up the Track Followed Close Behind the Derrick Car. Lower Right: Swinging In the Final Span, 35 Ft. Long, with a Heavy Crane. Upper Center: Locating a Portable Saw Mill at the Bridge Site Helped to Speed Up the Work. Lower Left: Air Operated Tools Were Used for a Wide Variety of Work.

west or 35-ft. channel span being handled later in the day by a heavier crane. With the erecting derrick standing just to the east of the span to be changed out, the rails on that span were removed, the old span lifted and swung at right angles to the track, and then lowered to the marsh beneath. The new span with deck in place was then picked off the blocking at the south side of the bridge and landed. Backing to the east on track No. 2 the derrick handled the successive spans in the same manner as the first. As soon as the first few spans had been placed, they were lined, the trackmen started replacing the track on the new spans,

The 1924 program for tracks Nos. 1, 3 and 4 was handled along the same general lines as for track No. 2, except that in each case temporary crossovers were installed for the diversion of traffic from the track where steel was to be renewed, rather than by cutting over any of the tracks as was done for the work on track No. 2 in 1923. By this means several hours were saved on the morning the work on each track was begun, as well as in rerouting trains for normal movement on the completion of the work on each track. Steel under tracks No. 1, 4, and 3 was changed out in the order named.

The steel for track No. 1 was unloaded and placed on cribbing between the two lines of piers and new decks placed on the spans. The same erecting derrick was used as for the 1923 work, but on track No. 1 steel was changed out in 14 hr. working time, or at an average of 8 min., 34 sec, per span, the track being out of service 57 hr.

The new spans for track No. 4 were distributed on cribbing at the north side of the bridge and the decks placed. For this part of the work the new steel was placed in 14 hr., the same time as for changing out the steel on track No. 1. This track was out of service 56 hr., 30 min., as against 57 hr. for track No. 1.

With the completion of the above work, preparations were made for the placing of the steel under the remaining track, No. 3, and in doing this all of the 98 spans were changed out in 11 hr., or with an average of 6 min., 44 sec. per span. The track was out of service for only 35 hr.

Mechanical Equipment Facilitated Work

All bolt holes in the timber guard rails were bored with air motors, and the nuts on the bolts applied by air, while the spacing blocks at the ends of the ties were cut, sized and bored by portable woodworking machines at the site of the work. Altogether some 12,334 lin. ft. of holes were bored in spacing blocks and timber guard rails, while anchor bolt holes in the masonry aggregated 3,136 lin. ft. Anchor bolt holes were drilled with jackhammers, only 30 sec. being required to drive a 2-in. hole 12 in. into the masonry. Compressed air was furnished by three different units consisting of a gasoline-driven compressor in a car at the west end of the bridge, augmented by steam-driven locomotive air pumps at the pump house, and finally, when still more air was needed, by the addition of a tie-tamper compressor coupled into the line.

The unloading and preliminary placing of the new steel was handled by a gang of 12 men and a foreman, and the framing of the ties by two carpenter gangs of 10 men each. On the days when erection was in progress the following force was used: Two steel gangs of 12 men each, one gang with an erecting derrick taking out the old steel and placing the new, the other following up with the lining of the new spans; three carpenter gangs handled the placing of guard rails, new walks between tracks, anchor bolts, etc.; and trackmen made up of an extra gang and two section gangs aggregating some 50 men handling rail. The old spans were all loaded by a derrick car from the freight tracks, thus avoiding all interference with high speed traffic.

It was estimated that the work on track No. 2 in 1923 could be done with the tracks out of service for 10 days as against 40 days required to handle the work under traffic, for changes in line and grade were made in erecting the new steel. Once the work was under way and everything working smoothly the men took a lively interest in closing the work in as soon as possible, with the result that traffic was restored in one-third of the estimated time, or in 72 hrs. The work on the remaining three tracks offered an opportunity to better the time made on track No. 2 through the use of crossovers in lieu of cutting over tracks, and the men did the rest. With the experience gained on No. 2 track the men were better acquainted with every move that had to be made, better team work resulted, and finally the incentive to do each track in better time than the preceding ones rounded out the results attained. Thus while No. 1 track was out of service 57 hr. as against 72 hr. for No. 2 track, No. 4 was returned to service in 56 hr., 30 min. and the final track, No. 3, was put back in service after but 35 hr. The only night work done was in drilling the anchor bolt holes, this proving to be the slowest operation of any.

The bridge work was handled by G. J. Klumpp, supervisor of bridges and buildings, and the track work by D. L. Robertson, supervisor of track.

Signal Gang Makes Real Home of Its Outfit Cars

A PIANO, carpets and white enameled bunks are prominent features of a bunk car outfit used by Signal Gang No. 2 on the Sacramento division of the Southern Pacific. However, they are but incidental to a general air of order and neatness which has been brought about through the effort made by the members of this gang in their desire to make a real home of the cars in which they live.

The outfit consists of five cars; a foreman's office and living car; a sleeping car for men; a combined cook and mess car; a water car and a material and tool car. The office car and sleeping car have been furnished with second-hand carpet runners, curtains,

A Place for Everything and Everything in Its Place

steel bunks enameled white and pictures. The bunks in the sleeping car are arranged along the walls with an open aisle in the center with a definite place for each occupant's belongings, neatly arranged for convenience. Water is piped from the water car to the sleeping car, office car and mess car with hot water coils in the stove to provide hot as well as cold water service to lavatories and a shower bath in the sleeping car.

The cars are equipped with fire extinguishers, while a hand pump installed on the water car affords additional protection and also delivers water to a small tank near the roof which supplies the shower bath.

By mutual agreement, the chores to be performed morning, noon and night, are divided among the members of the gang, each man having a definite assignment. As a result, there is no lost motion.

While there is no definite program as to what will transpire any evening, the men commonly devote considerable time to studies of their work. When plans are received covering work to be performed or revised standards are issued, the gang assembles in the sleeping car for a study and discussion of the plans in detail, not only as to the method of performing the work but also as to the exact amount and kind of material required. As a result, when the men are assigned to different duties they know what is expected of them

The Foreman's Office

and the work is completed in such a manner that when an inspection is made it is not necessary to send some of the force to change, alter or do further work. This results in considerable economy. On other evenings the time is spent in entertainment and recreation, in the course of which the piano plays an important part.

We are indebted for the above information to W. H. Kirkbride, engineer maintenance of way and structures, Southern Pacific, San Francisco, Cal.

The Care and Operation of Railway Motor Cars

By Harry Porch

THE MOTOR CAR is nothing more or less than a maintenance tool. To obtain the proper result one must give it the same care he would give the track level or carpenter's saw if he expects to operate it with the mimimum delay in the transportation of men to and from work. Surely a track foreman would not use a defective track level when surfacing his track; neither should he operate his motor car in an unsafe condition and thereby endanger his life and that of his men.

One of the important items in keeping a car in good working order is cleanliness. Keep all oils clean for the power plant so that there will be no chance of a "short." Clean oil will not "short" a car, but the small particles of a metallic nature which are caught and held by the oil will. Delays from this or any other cause are costly since a number of men must stand by while the operator spends time trying to locate the trouble. An inspection of the brakes, wheels and axles should be made each morning before starting on the day's work; if this is done accidents will be largely eliminated, especially those due to derailments through defective parts.

Any one who has operated a two-cycle type motor car, even for a short distance, knows that it is important to have the proper mixture of lubricating oil and gasoline in order to keep the engine cool and save the bearings. Too much oil is as objectionable as not enough oil; both will cause the engine to heat. Carbon is costly to remove as it is necessary to take down the power plant the same as for the installation of new bearings. The hard oil cups must have proper attention and hard oil or cup grease should be kept in a covered container free from dust and dirt at all times.

A motor car designed to carry a section gang should be equipped with rail sweepers and a safety railing at the front end. Push cars should be trailed and attached to the motor car by a draw bar with a pin which can be removed in case it is necessary to set both cars off to clear a train.

Like the switch, no one should operate a motor car other than the man in charge and responsible for its operation. Torpedoes and a red flag should always be kept on the car so that the operator can use them, not only for his own protection, but to replace any torpedoes struck by his car which had been placed on the rail by trainmen. Every motor car operator should obtain a complete line up from the train dispatcher as to the time of regular and extra trains, and he should make certain that the train dispatcher fully understands the direction in which the motor car is to be operated, whether on a main or branch line. Where the view is obstructed in cuts he should take the added precaution of sending a man ahead with a red flag as it often happens that a light engine is run which may not be shown on the line up. The writer appreciates the fact that when an operator is alone on a car it is necessary that he depend on the line up since he has no one to send ahead to flag, but he should operate the car very slowly around curves and keep a sharp lookout not only for trains, but also for other motor cars.

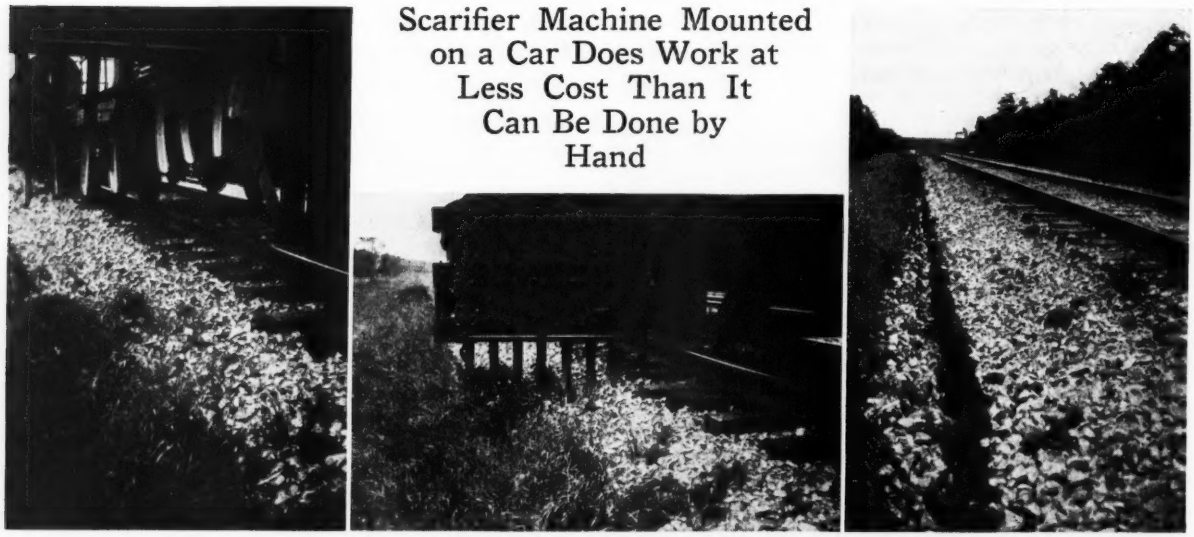
Dispatchers Should Co-operate

It is felt by most motor car operators that train dispatchers do not realize the danger confronting a man on a motor car and that therefore some train dispatchers are at times somewhat lax in giving line ups. In order to assist the motor car operator as much as possible, the train dispatcher should be very careful to see that all trains are shown on the line up. When he has furnished a line up to a man making a trip alone over a sub-division with considerable distances between open telegraph offices, and it becomes necessary to run a light engine or an additional extra—he should give the engineman a message with his train orders telling him to look out for a motor car between certain points and whistle on all curves where the view is obsructed. The writer is fully aware of the fact that rules now in effect require enginemen to whistle for all highway crossings and also curves, but in many instances this is not done. Such instructions would certainly be appreciated by every one operating a motor car and may some time save a life.

The motor car operator who wants to avoid motor car accidents will operate his car prepared to stop at highway crossings, and wherever the view is obstructed. The automobile driver is not looking out for motor cars on the track, he looks for trains, but does not always stop for them as the records show. Foremen would do well to observe closely and make sure that all tools are placed with care. Accidents cannot all be avoided, but every one can help keep the slate as clean as possible.

New York Central Cuts Weeding Costs and Renovates Ballast

Scarifier Machine Mounted on a Car Does Work at Less Cost Than It Can Be Done by Hand



Left—The Rake Raised Clear. Center—The Rake at Work. Right—The Result

ON HEAVY traffic roads, the problems of keeping down the weeds and renovating the ballast are frequent and important ones. On many roads they are handled separately and often by hand labor. Through the development of a scarifying machine or weeding car, the New York Central has been able to combine these problems and to do the work quickly and efficiently with a considerable saving over hand labor methods. The machine is operated in a work train and digs up and loosens the ballast, pulls weeds and cuts sod thoroughly according to the way in which it is used. During 1924, four of these weeder cars were built and put into service.

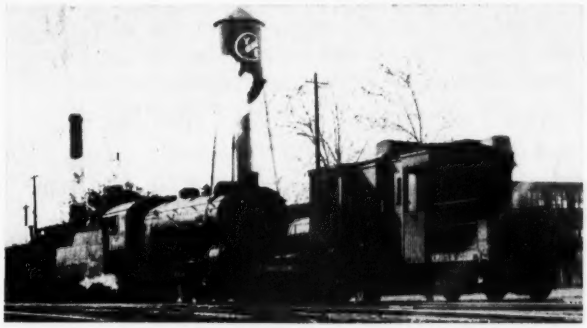
Each unit consists of a steel underframe car of standard construction on which is mounted the actuating devices for controlling the operations, a double set of adjustable rake teeth, a protective housing for the operator and an air reservoir. The severe service imposed on this type of equipment necessitates rugged construction and the underframe used is of the 100,000-lb. capacity type with 5½-in. by 10-in. journals. The side sills are recessed at the center and rigidly braced.

The pulling of weeds and the scarifying of the ballast is performed by means of two sets of adjustable rakes, one on each side of the car and located in the recessed section of the side sills. Each rake is equipped with seven steel teeth of 2-in. by 2-in. section and curved at the point end in typical rake style. These teeth are spaced 7 in. center to center and are alternately offset or staggered, seven inches apart at the points, thus actually forming two rows with four teeth 14 in. apart in the forward row and three teeth

Before (Left) and After (Right) the Passing of the Scarifier

14 in. apart in the rear row, with a distance of 7 in. between them. The shafts of all seven teeth are, however, carried in the same plane in the rake frame. This offsetting of the points was found to give the most effective loosening of the ground surface, and at the same time permit the ballast, etc., to pass freely between the rake teeth without blocking or piling up in front of it. Where it is necessary to cut sod along the tracks a special type of cutting tooth has been designed. This can be substituted for any of the other teeth, according to the needs of the situation. The teeth are held in the rake frame by U-bolts and can be removed quickly.

The rake frame on each side is suspended from and hinged to a slide operating in vertical guides attached to the car, the support of the rakes being through a heavy swivelled frame connected to the slide and to the center of the rake frame. One end of the rake frame is anchored to the car by means of a long and heavy pin. The design is such that the rakes may be reversed easily and quickly for operating the machine in the opposite direction without the necessity of changing teeth or of turning the car for reverse operation. The vertical guides support 14-in. air cylinders which are used to raise and lower the rake frames.



This Outfit Does the Work of Many Men

The frames can be raised to any desired height to clear switch stands or other obstructions and lowered to any desired depth for pulling weeds or renovating ballast.

The rakes can be swung into position at right angles to the center line of the car, the normal operating position, or swung parallel to the center of the car and into the recessed section of the side sills. In this closed position they are well within the regular limits of the body of the car. The rakes are swung into or out of working position by means of long stroke, 6-in. air-operated cylinders mounted along the outside edge of the car floor. The cylinders are equipped with a crosshead and protected guide. One end of an extension arm is conected to the crosshead and the other is coupled to the outside of the rake frame through universal joints, thus permitting the operation of the rakes in any up or down position. When the wings are at right angles to the center line of the car, they will not clear traffic on adjacent tracks.

The functioning of the various mechanism is controlled by air from the train line. The different air cylinders are interpiped and the control is effected by means of an improved type of four-way valve. The operations of the rakes may be made together or separately on both sides of the car, the unit is pushed by a locomotive, which also furnishes the compressed air for operating the cylinders. The speed under normal operation is between six and eight miles an hour, depending upon roadbed conditions. The rakes are used on both of the ballast shoulders and in the intertrack space, scarifying the ballast to a depth of about 6 in. below the bottom of the ties. During the past season, the New York Central Lines east and west covered approximately 2,000 miles of track in this fashion, the results indicating that a considerable saving had been made by this method over hand weeding. In addition the stirring up or scarifying of the ballast improved the drainage and made the renewal of ties much easier.

We are indebted to J. V. Newbert, engineer maintenance of way of the New York Central Lines east, for the above information.

Our Responsibility For Proper Relations With the Public*

By John Sour,
Section Foreman, Kansas City Southern, Neosho, Mo.

EVERY employee of the company has a certain amount of responsibility in maintaining good relations with the public, and we of the maintenance department have perhaps a greater responsibility along this line than those of almost any other department because of the fact that we have a greater opportunity of coming in contact with the farmers along the right of way and the people living in the towns through which our railroad runs. These are the people who patronize our road if we make them feel that it is a good road and that we have their interests at heart.

Some of the farmers along the line seem to feel that the "section boss" is the main representative of the railroad, and if he does not give them a fair deal they consider that the railroad has done them a wrong. Likewise, if the foreman does all that he can to keep his road crossings, cattle guards and right-of-way in good condition; makes small repairs to right-of-way fences, particularly along pasture land, and sees that farm gates are kept in such condition that they can be closed, the farmers are more apt to have a good feeling toward the road, and be more willing to co-operate with the section foreman in any way that they can.

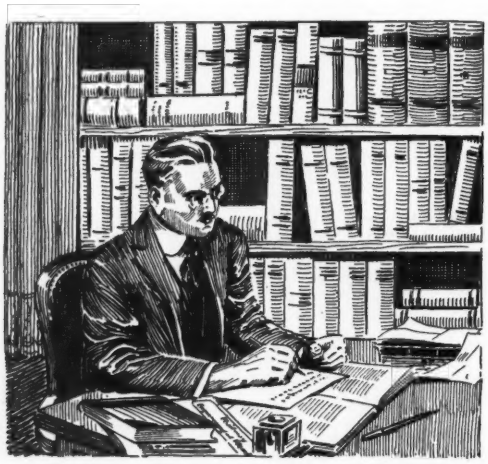
If the people who live along the right-of-way see something wrong at any point, they will call it to the attention of the section foreman if they have confidence in him. I had several cases where something dragging on the train has caught crossing boards and pulled them out, and people living near have called me on the phone and told me about it, making it possible for me to go and make repairs before an accident occurred.

Our standing in our communities has an influence. I think it is a good thing for the section foreman to be a member of the city council if possible, for, in this way, he has a chance to become better acquainted with the public, and the railroad has a representative who can explain matters that come up in connection with the railroad and take care of small items, thus saving a great deal of correspondence, and sometimes keep from having ordinances passed that would cause extra expense to the railroad.

Last, but not least, the foreman can influence the public to have a better opinion of the road by being a booster for the company. He should read railroad magazines and keep himself well informed on railroad matters so that whenever he has an opportunity he can present the railroad's viewpoint on any question that comes up concerning the railroad.

*Presented at the meeting of the Kansas City Southern Maintenance of Way Association at Sulphur Springs, Ark.

What's the Answer?



This department is designed to serve as a reader's service bureau, wherein the many problems which arise in the routine maintenance of tracks, bridges, buildings and water service facilities, may be subjected to frank and thorough discussion. The value of the service thus rendered is proportionate to the extent to which readers avail themselves of it, in submitting questions and in lending their co-operation by offering answers to the questions presented.

Questions to Be Answered in August

1. What size of compressor plant is most suitable for a railroad bridge erection crew handling both maintenance and the erection of all except the largest bridges?

2. When using chemicals to kill weeds at what period of their growth should the application be made?

3. Should a motor car be run with the power wheels in front or in the rear? Why?

4. Is it good practice to lay a brick floor in a roundhouse without a concrete base?

5. How should an inverted syphon culvert be constructed to facilitate the removal of sediment or other debris?

6. What would be the ratio between the labor cost and the charges for gas and metal in building up frogs and track joints by the oxy-acetylene process?

7. Should the frost boxes of water tanks and water columns be left open during warm weather?

8. Should foremen be specially selected for work train service? Should the roadmaster or his assistant make it a practice to accompany work trains?

The Qualifications of a Crossing Flagman

What are the qualifications of a crossing flagman? How should he be selected? What measures should be taken to insure that he is constantly on the alert? Is it practical to give him other duties?

It depends Upon the Character of the Crossing

By E. D. Swift
Engineer Maintenance of Way, Belt Railway of Chicago, Chicago.

Crossing conditions, like many other situations in this world that can be named briefly, are extremely variable, and the qualifications which may be sufficient for properly protecting one crossing may be found entirely inadequate at another. It may be readily seen that a single track crossing with a comparatively unimportant street or highway presents a situation not to be compared at all with a crossing of several tracks over an important street or trunk highway, and so it seems to me that the situation pertaining to choosing a crossing flagman is fundamentally no different than that which presents itself in the choosing of men for other lines of work, and if best results are to be obtained the individual crossing and its peculiarities must be taken into consideration.

Speaking generally, I find myself somewhat out of sympathy with the criticisms that are made from time to time by railroad people as well as by others that the use of superannuated employees as crossing flagmen is not conducive of best results. There are many crossings where such men can perform all the required duties in just as effective a manner as a younger or more vigorous man. In fact I would say that in most circumstances the willingness of a young or vigorous man to take employment as a crossing flagman at an unimportant crossing would be sufficient reason for suspecting that he was lazy, and that being lazy he would not perform his duties satisfactorily.

The situation at a very busy crossing, however, is entirely different, and it would be my opinion that the kind of a man who would give the greatest satisfaction at such a location would be one who was in no way physically incapacitated, who was vigorous and authoritative in his actions, but one who at the same time did not have training or educational advantages sufficient to qualify him for a higher grade of work. In saying this, I have in mind that no particular advantage is apt to follow the placing of a man who is qualified for better work in a position of minor qualifications, and one which does not train its occupant for promotion.

Thorough Supervision Is Necessary

By S. J. Steiner
Engineer Maintenance of Way, Chicago, Aurora and Elgin, Aurora, Ill.

From the very nature of his position, the actual qualifications of a crossing flagman are that he be sufficiently able bodied and alert to get out from his cabin in ample time in advance of the train to prop-

erly protect his crossing, and that he also be intelligent enough to carry out and obey the instructions given him. A man who comes up to this standard is unlikely to have any accidents traceable to his negligence. Insofar as being able bodied is concerned, he should have good sight, hearing and health.

The manner of selecting crossing flagmen, however, is generally like buying a "pig in a poke." Although the duties of the crossing flagman are such that few other railroad employes are more closely concerned with the common safety of the traveling public, no ambitious man would aspire to the position. Therefore, the field from which to draw prospective flagmen is limited to men far along in years, or men who are physically unfit for work other than flagging.

In a large organization, there are always a number of employes who become unfit for their regular work due to age or injuries and it is always desirable to take care of these men as far as possible when a vacancy arises. In hiring men from outside the organization for crossing flagman work, the section foreman or the roadmaster should hire these men and they should certainly acquaint themselves beforehand with the physical and mental condition of the prospect. Too much stress cannot be laid on this point, for after a man goes on the payroll, it is not always convenient to make a change if he proves unsatisfactory.

The problem of keeping a crossing flagman alert and functioning properly in his duties is one that will take much attention. While the section foreman is supposed to oversee the flagman and make sure that he is flagging properly, he is not in a position to watch him a great deal of the time. The foreman's duties require his attention at other parts of his section and the proper supervision of flagmen certainly cannot be left entirely to the foremen. It, therefore, becomes the duty of the roadmaster and his assistants to watch over these men to see that they are doing their work properly. In order to check up on the flagman from all sides, it is necessary to be on the ground unobserved and watch how the man does his work and then advise him if he is not doing it properly.

Not many flagmen are stationed at crossings where the number of trains passing daily is small. Consequently, I do not think it expedient or practical to give a flagman any other duties than to flag his crossing in the proper manner. This is especially true on our railroad, as our flagmen have a train passing over their crossings on an average of every 15 min. and their attention should certainly not be taken up by any other duties than flagging.

Should Work Trains Be Employed Overtime

Under what circumstances is it economical to incur overtime for work train crews in order to increase the output from maintenance gangs which they are serving?

The Decision Must Be Based on Careful Analysis

By F. W. Hillman
Division Engineer, Chicago & North Western, Chicago.

To determine whether it is more economical to incur overtime for a work train to increase the output of the maintenance gang which it is serving, one should balance the cost of the train's overtime with the value of the output of the gang. Obviously, if the latter is the greater it is economical to work the train overtime.

As a general proposition it is not economy to incur overtime for a train crew with a gang which costs less per hour than the work train. However, it is sometimes possible by working overtime to avoid another work-train day. For example, section gangs may have been bunched to do certain work and by working them overtime they can be returned to their regular duties quicker. In another case, perhaps, a train may be worked overtime to advantage in moving camp or in going to a new tie-up point and thus permit starting out with the gang promptly the next day.

With very large gangs it may be cheaper to pay the train crew overtime and take the men back to headquarters on the travel time period rather than in a period when it would be necessary to pay the full rate and thus increase the gang's output per dollar. The final analysis is the value of the work accomplished as compared with the expense, keeping in mind possible savings on succeeding work.

It Depends Upon the Size of the Maintenance Gang

By R. H. Smith
Division Superintendent, Norfolk & Western, Roanoke, Va.

Where the maintenance force is sufficiently large so that its rate of pay exceeds the rate of pay of the work train crew it has been my practice to render the gang sufficient work train service to keep it actively engaged during the full assigned working period despite the fact that overtime is involved for the work train in getting to and from the point where it is rendering service. Where the maintenance force is small we regulate the work so as to reduce the overtime hours of the work train crew to a minimum.

Operating Radius for Bridge and Building Motor Cars

How far is it economical for bridge and building crews to travel to and from work each day on motor cars before putting camp cars in service or shifting camps to a new location?

Keep the Camp Cars Close to the Work

By H. E. Murphy
Engineer Maintenance of Way, Chicago, Burlington & Quincy, Lincoln, Neb.

Our master carpenters are of the opinion that we get much more work out of gangs that are housed in outfit cars than from those which travel from place to place on motor cars and board out at various places in the towns en route. The reasons given for this are that in the outfit cars the men are usually closer to their work, are kept together as a gang and report promptly for each day's work. When the men scatter around the town in which they may be stopping over night, it has been found that more of them are inclined to lay off than if they are housed in outfit cars on the line.

Unless a bridge and building gang is doing very light repair work on bridges, such as lining or surfacing, or is unloading material, in which case it may work in a day within a radius of two or three stations of the boarding cars, I feel it is much more economical to move the outfit cars as often as may be necessary to assure that the gang will always be located at the station nearest to its work.

Our bridge gangs average about eight men per gang and the average hourly rate per gang approximates $5.

In running the gang very far on motor cars it is very easy to consume an hour, and hour and a half, or two hours' time, and this is not productive work. Ordinarily, I do not believe we should run our larger gangs more than four or five miles and when their work lies closer to the next station, the outfit cars should be moved promptly as the small delay imposed on the local freight will be more than offset by the reduction of time spent by the gang in going to and from work.

No Definite Rule Can Be Given

By J. A. S. REDFIELD
Assistant Engineer of Maintenance, Chicago & North Western, Chicago.

I do not believe that this is a question which is subject to mathematical analysis. Our bridge and building camps are generally kept in commission all the year round and are moved from station to station as the season's work progresses. Possibly if we did not have a camp in commission we might let the men work out of their home headquarters on their motor cars as much as two stations. Individual circumstances govern entirely in lining up an organization of bridge and building men assigned to camp cars.

Vitrified Pipe in Water Supply Lines

Can vitrified pipe be safely used for water supply lines and, if so, under what conditions and according to what methods should the work be done?

It May Be Used Under Certain Circumstances

By C. R. KNOWLES
Superintendent Water Service, Illinois Central, Chicago.

Vitrified pipe is among the earliest known materials used for water lines. Probably the oldest known pipe line still to be seen is that which supplied a part of Jerusalem's water about 1,000 B. C. This pipe line was constructed entirely of earthen pipes about ten inches in diameter, the length of the pipe being approximately twelve miles. This pipe line brought water from the reservoir near Bethlehem, known as the "Pools of Solomon," terminating at a point west of the site of the temple.

Vitrified pipe lines can be safely used for water supply lines under certain conditions. I have in mind particularly a vitrified pipe line which is used for connecting a series of wells with the main reservoir, water being discharged from the wells by air into the reservoir or sumps located at each well and flowing by gravity through vitrified tile to the main reservoir. This line has proved entirely satisfactory and it is my opinion that any vitrified pipe lines operating under similar conditions and properly laid would prove quite as satisfactory.

Another line constructed of 12 in. vitrified pipe about 250 ft. long was laid from a reservoir to a suction well with a fall of approximately 8 ft. This line was laid on an embankment and leaked at the joints to such an extent that it was impossible to keep the line in service with the result it was replaced with cast iron pipe.

The principal difficulty in using vitrified pipe appears to be from leakage at the joints. Vitrified pipe can be obtained in almost any strength desired and heavy enough to stand considerable pressure but on account of defective joints there have probably been more failures of vitrified pipe line than there have been lines successfully used.

The same care and practically the same methods should be followed in making a joint in vitrified pipe for water as with cast iron pipe. The joint should be first caulked firmly with hemp or oakum, leaving a uniform space for the cement. The cement should be applied either alone or mixed with sand, depending upon the size of the opening in the joint.

The cement should be placed upon a piece of canvas and tamped from the canvas to the bell, placing the cement in the bell by hand until it is about half full and then caulking it tightly into place with a wooden caulking tool, continuing this process until the bell is packed solid out to the face and leaving a bead on the finished joint. As soon as the initial set of the cement has taken place the joint should be covered with earth to prevent it drying out before curing properly.

Water for human consumption should not be carried in drain tile on account of the possibility of pollution through poor joints. A certain city in Illinois used a vitrified pipe from a well to a nearby reservoir, this water line being laid under a sewer line constructed of the same material. A leak in the sewer line passed through the ground and entered the joint of the water line with the result that sewage flowed into the reservoir used for drinking purpose, polluting the drinking water supply and causing an epidemic of dysentery.

It is advisable to restrict the use of vitrified pipe for water to points where the line is subject to but little pressure which ordinarily should not exceed a 10-ft. head. If the water is used for domestic purposes, under no circumstances should vitrified pipe be used where there is a possibility of either surface or underground pollution.

Taking Account of Defects in Stringers

Should a bridge stringer be placed so that the majority of knots, checks or other defects come at the bottom or top? Is it more important to turn the stick in such a position that the heart wood is at the bottom?

The Defects Should Be on Top

By C. S. HERITAGE
Bridge Engineer, Kansas City Southern, Kansas City, Mo.

In answer to the first question knots, checks or other defects should be on the top of the stringer for the reason that the stringer will be stronger with these defects in the compressive region of the timber than it would be if the defects were in the tensile region of the timber. In answer to the second question, if the stick is clear of defects other than sap, the sap should be turned down for the reason that sap will last longer on the lower side while the top side, being heart, will afford less fire hazard.

Several Factors Are Involved

By STRUCTURAL ENGINEER

About the only defects permitted in railway bridge stringers are sound knots and these have practically no effect on the compressive strength but do reduce the tensile strength or what might be termed the resistance of the piece to pulling apart lengthwise. The reason that the knots affect the tensile strength is, of course, obvious; the presence of knots causes irregularity in the longitudinal wood fibres. For this reason it is deemed desirable to place stringers so that

most of the knots are away from the tensile strength of the stringers, in other words, near the bottom of the stringer in the middle of the span and near the top where the stringer passes over a bent.

This requirement may conflict with that of placing the stringer so that the edge with the largest amount of sap wood is at the bottom, this being a definite requirement in the specifications of the American Railway Engineering Association for workmanship of pile and frame trestles. The reasons offered for this provision in the specifications at the time of its adoption by the association was that by placing the sap wood on the under side of the stick it would be less exposed to water and to falling cinders and would therefore be less subject to decay or having partly decayed, would keep the highly inflamable, punky wood away from sparks.

A further consideration in placing stringers is the requirement imposed by some that sticks should be so placed that the annual rings will be convex upward at the top of the stick, in other words, so that the rings of the wood will be highest at the center and slope down to the sides with the thought that this will cause the sticks to shed water better than if the rings form a trough. However, unless a piece has a boxed heart, that is, has the pith within the stick, the requirement that the sap wood shall be at the bottom definitely conflicts with the requirement that the stick will be in a position best to shed water. With the increased use of treated woods these last two considerations are no longer of as great importance as formerly.

Ventilating Attics

Should the attics of railway buildings be provided with openings to permit the circulation of air during hot weather? If so, how should this be done?

Attics Should Be Ventilated

By A. M. Griffin
Engineer of Buildings, Atlantic Coast Line, Wilmington, N. C.

It is my recommendation that attics of railway buildings should be ventilated. This may be done by the use of: (1) dormer windows properly located; (2) metal ventilators in the ridges and (3) screened ventilators under the cornice. Metal ventilators in the ridges can also be used in conjunction with cornice ventilators. It is my opinion that a combination of the second and third methods is the most satisfactory and the one that is being used most generally at the present time.

Ventilation Is Desirable

By a Building Engineer

Almost any wood, metal or stone surface exposed to the sun on a hot summer day attains a temperature higher than that of the atmosphere and if such a surface comprises a roof that is not unusually well insulated from the interior the heat of this roof is communicated to the air underneath. If this air space under the roof is entirely enclosed it tends to attain a temperature equal to that of the roof with which it is in contact. Therefore, unless the attic space is provided with some sort of openings which provide for a change of this air, either through convection currents or the influence of wind, this air will attain a temperature much higher than that of the outside atmosphere and by communicating its heat to the space below the attic cause serious discomfort to those who occupy the rooms below.

The remedy is to provide ventilation which may be obtained in various ways, the important requirements being that the ventilators or openings be placed in such positions as to take advantage of the circulation brought about by the convection currents and wind and also that the openings be of such nature as to keep out rain, even when driven at an extremely flat angle. Where winters are cold it may be found desirable to close such openings during the cold season. As an illustration of the importance placed on the ventilation of the air space under roofs, it may be mentioned that in extremely hot climates as, for instance, the deserts of Arizona and California, buildings are occasionally constructed with false roofs, that is, with a second roof supported a foot or more above the roof over the building by means of posts so that the air is entirely free to circulate between the upper and lower roofs.

Removing a Light Weed Growth

What is the most efficient method of removing a scant growth of weeds and grass from stone ballast?

They Should Be Pulled

By J. A. S. Redfield
Assistant Engineer of Maintenance, Chicago & North Western, Chicago.

It is uniformly recommended that a chemical or burning process is the most efficient way of removing a heavy growth of grass in rock ballast, particularly such a growth as occurs on lines where stock trains are quite numerous. However, on lines having the lightest growth, the most economical method is, undoubtedly, to pull the weeds up by hand. Where the line divides, between the two methods, can only be determined as a result of investigation in specific cases which are close to the border line. It is hard to define the difference between what would be called a "heavy" growth of grass in stone ballast and what would be known as a "scant" growth.

It Depends Upon the Kind of Ballast and Weeds

By Eastern Trackman

A scant growth of weeds is assumed by the writer to mean a growth which is scattered through the ballast and covers only a relatively small part of the ballast surface, in other words, such a growth as would be found in rock or heavy gravel ballast that has not become badly fouled. It might also be defined as a growth so light as to make the use of weed burners or the application of chemicals clearly wasteful.

The removal of a growth of weeds of this nature is necessarily done by hand because no more economical method has been developed thus far and the method of doing it depends upon the kind of weeds and the character of the ballast. In rock ballast of good quality the most practical method is to pull the weeds because this causes the least disturbance of the ballast and because the results obtained with hoes are entirely out of proportion to the effort. Pulling by hand may also be most advantageous in gravel and light ballast unless the weeds are of a character that do not pull readily because the stems or roots

break off. However, if the weeds are small and fairly close together the work can be done much faster with hoes.

On some railroads the removal of weeds by hand, either by pulling or with the use of hoes, is carried on according to a regular program on a certain day each week as a part of the regular policing and if a consistent plan is followed the track can be kept in a clean and neat condition in this manner. The substitution of labor saving methods of removing weeds is, of course, necessary in any location where hand weeding becomes too expensive, but it is impossible to outline any rule that could be followed in reaching a decision on this matter. This is something that must be determined by experiment. The same holds true of the section of the particular type of labor saving, weed killing methods—whether it is to be accomplished by poisoning, burning or the use of a mechanical substitute for the hoe such as diskers or ballast harrows.

A Problem in Superelevation

What is the proper amount of elevation per degree of curvature which should be given curves up to and including five degrees on a grade where the speed of freight trains ascending is as low as four to ten miles and descending is limited to 25 miles per hour and where passenger trains do not exceed 40 miles per hour?

No General Rule Can Be Given

By E. H. Brock
Roadmaster, Canadian National, Melville, Sask.

While the theory of elevation is easily understood and practice will teach the amount needed in any given case, it seems very difficult to find a rule having a scientific basis which may be applied to all conditions of track work; in fact, no hard and fast rule can be laid down as to the amount of elevation curves should have. The elevation must be governed by conditions.

We have to take into consideration the different speeds of trains operating over the district or different parts of the district. Owing to the fact that it is not safe to give any curves any more elevation than can be maintained, it is necessary to give the curves on grades over which heavy low speed trains are run just as little elevation as possible and I have learned from practical experience that curves of four and five degrees will ride comfortably at a speed of 35 miles per hour and are safe for a speed of 50 miles per hour, with ¼ in. elevation per degree. As a matter of fact, on most of the western roads which are not any too well ballasted, we cannot maintain any greater elevation. High superelevation is neither necessary, economical nor safe; the greater the elevation the greater the tendency to develop bad surface, bad line and spread track—which means dangerous track.

There is only one way to ascertain the correct elevation for any curve of any given degree, and that is by experimenting on different curves and when a curve is in a condition such that the surface of the inside rail can be kept up with the same amount of work as the high or outside rail and the rail wear is equal and the gage of the track gives no trouble and the curve rides well, then it has the proper amount of elevation.

Practical experience has taught me also that ½ in. elevation per degree for curves up to five degrees rides comfortably at 65 miles per hour, and is safe for 80 miles per hour. I tried this out in 1914, 1915 and 1916, on a road where the speed limit for passenger trains was 60 miles per hour, but where the actual speed was at times 65 miles per hour, and mail trains were not restricted and attained speeds as high as 85 miles per hour. Uniform gage, line and surface, starting the elevation at the point of spiral and running it out at the point of tangent are just as important, or more so, than the amount of elevation.

It Depends on the Character of Traffic

By P. Petri
Division Engineer, Baltimore & Ohio, Cumberland, Md.

If passenger traffic predominates and it is desired to make travel as comfortable as possible, and if the passenger trains do not operate at a speed of more than 40 miles per hour, I recommend a superelevation of one inch per degree of curvature. This will provide comfortable riding at this speed and also offer a large factor of safety in the event of excessive speed, ranging from 80 miles per hour on a one-degree curve to 60 miles per hour on a five-degree curve.

If the freight and passenger traffic over the line are of equal importance and the freight train load is an important consideration, I recommend the following superelevation for curves:

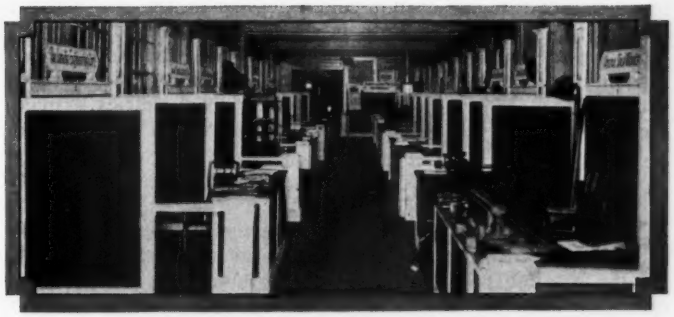
Degree of curve	Superelevation	Elevated for	Safe speed
1	¾ in.	33 m.p.h.	80 m.p.h.
2	1½ in.	32 m.p.h.	80 m.p.h.
3	2 in.	31 m.p.h.	72 m.p.h.
4	2½ in.	30 m.p.h.	62 m.p.h.
5	3 in.	29 m.p.h.	55 m.p.h.

If the freight traffic predominates and the locomotives are loaded to capacity when ascending the grade, which naturally reduces their speed to a low rate, reduce the superelevation on curves as much as possible in order to lower the curve resistance for these trains. Under these conditions I recommend a superelevation of ½ in. per degree of curvature and the placing of a speed restriction of 30 miles per hour on five degree curves and of 35 miles per hour on four degree curves in order to enable the freight train to haul the largest possible tonnage.

Other local conditions such as ruling grade joints, slow speed points in the vicinity of interlocking towers, switches where helper engines cut in or out and places where freight trains pull in and out sidings may influence the above recommendations but in general I have found them satisfactory.

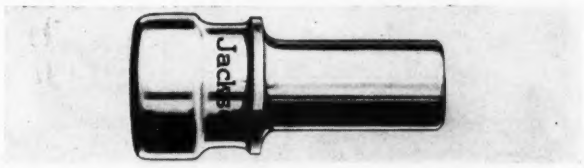
An English Idea for Highway Crossing Gates

New and Improved Devices



An Alloy Steel Rivet Set

THE INGERSOLL-RAND COMPANY, New York, has now produced a rivet set for pneumatic hammers which is claimed to last much longer than ordinary sets. It is said that users are finding it economical because of the great increase in the number of rivets which can be driven per set and by reason of the elimination of delays and losses of time due to breakage. This new set is called the "Jackset."



The Jackset

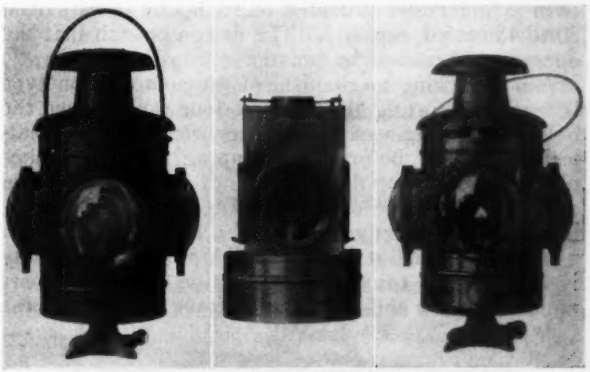
It is made of alloy steel which will stand a much greater degree of heat from hot rivets without drawing the temper. It is specially forged and then heat treated by a new process. This new set is the result of hundreds of tests on different steels and heat treatments, made in the effort to produce a tool better able to withstand the stresses of riveting service than the ordinary carbon steel rivet set.

A New Design of Long-Time Burning Switch Light

ONE OF THE recent advances in railway signal lamps is the construction of a new lamp of advanced design, wherein long time burning is accomplished by a method which is claimed to eliminate soot, smoke and wick carbonization. While it is classed as a 7-day lamp, numerous tests have shown that it can be left unattended for 10 days in an emergency, the oil capacity being more than sufficient for that period. In these tests, the lamp also maintained a satisfactory flame for periods of from 30 to 60 days, with no attention other than re-filling the fount. It conforms to the standard R. S. A. dimensions and has been built more than ordinarily rugged.

The lamp is air and watertight up to the point where the hinged cover rests, and when this cover is thrown back, the inner lamp can be lifted out by a bail attached to it, without touching any heated parts. The inner lamp carries a 36-oz. fount, the bottom of which is made in one piece, and a rectangular casing in which four clear glasses are fitted. One of these glasses is the hinged access door. These glasses are easily removable, being held in place by spring rings. They are maintained perpendicular to the lens axis by two guides. The filler cap is placed outside the lamp casing, as it is not generally necessary to open the inner lamp while tending. No glass chimney is used. When the cover is closed, the inner chimney in the cover is forced down on to the top of the inner lamp, making an airtight joint. Two springs under the lamp fount tend to push the inner lamp upward, and also serve to protect the flame from sudden shocks from passing trains.

The air enters the lamp by a series of holes around the circumference of the cover and just under the protecting curve of the roof. It then passes through a baffle and insect screen and flows downward between the inner lamp and the outside casing. As the upper part of the inner lamp is insulated by a cone piece inside, the air is only gradually heated with the result that the inner surface of the fresnel is subjected only to cool air and condensation does not occur. The air enters the inner lamp through a series of holes at the base, and serves mainly as a carrier for the ascending gases, only a portion of the oxygen being consumed. The location of the inlet and outlet holes is such that



The New Seven-Day Lamp

driving rains and wind storms cannot affect the operation of the lamp.

The method of oil burning depends upon two patented features. The first feature is a vaporizer so constructed as to limit and control the quantity of oxygen available for combustion at the tip. This local restriction of oxygen prevents complete combustion from occurring at the surface of the wick, and allows a temperature only sufficiently great to vaporize the oil. The heated and unburned oil vapor rises through the vaporizer, receiving a further supply of oxygen at the top where it can combine readily to produce a luminous flame. In addition to this reduction in wick temperature, a further precaution against carbonization has been made by utilizing a specially prepared wick. Selected long fiber cotton is used and is treated by a process for the purpose of preventing any possible

formation of tarry or carbon-caked deposit on the surface of the wick. The lamp is so designed that any high grade kerosene, free from water and dirt and reasonably free from sulphur and mineral impurities can be used. It is manufactured by Todd Specialties, New York.

A New All-Steel Dump Car

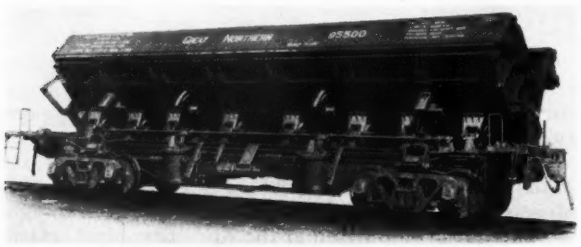
FOLLOWING several years of experience in the building of dump cars for various classes of service, the Koppel Industrial Car & Equipment Company, owned by and operated as a subsidiary of the Pressed Steel Car Company, Pittsburgh, Pa., has developed a complete line of air operated dump cars ranging in capacity from 12 to 45 cu. yd. and up to 75 tons capacity, depending upon the service for which the cars

The Car Is Entirely Self Clearing

are required. The engineers of this company are definitely of the opinion that the best results can be obtained with the use of vertical air cylinders on each side of the center sills for the application of the power necessary to effect the dumping operation. Single cylinders on each side of the car are provided on all cars of capacities ranging from 12 to 25 cu. yd. and twin cylinders are provided on each side of car, from 30 to 45 cu. yd. capacity. The design is such that the operation is entirely automatic.

A new locking mechanism of the compression type is used, supporting the body at four points over the bolsters by compression members which are automatically removed before the dumping operation takes place. The locking device does not employ springs in any form or depend on the absolute alignment of locking shafts for effective operation.

When dumped at an angle of 45 deg. the car body is arrested by contact with friction brake bumpers mounted on the ends of the underframe bolsters. These



A View Showing the Operating Features

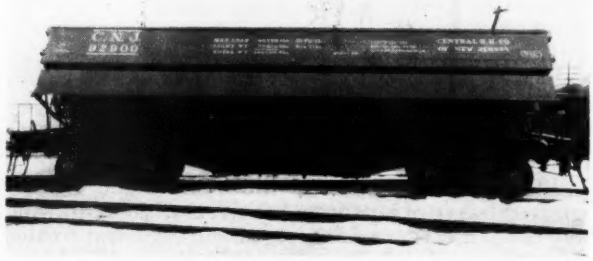
bumpers reduce the shock on trucks and the underframe. The mechanism for lifting the sides or doors of the car is of a new design. The normal opening required is about six feet but practically any reasonable door or discharge opening can be obtained.

The body hinges are of the three-point type. Normally the body rests at its centerpoint but during the dumping movement the turning point is shifted further out. This arrangement throws the discharge edge of the body out considerably further from the rail than would be the case with a single-point hinge without increasing the height of the car. The construction of the car permits of dumping at an angle that is said to make the car entirely self-clearing. After the load has been discharged the air is applied to the cylinder on the dump side of the car to return the body to its upright position. It is also said that this feature makes the use of aprons or floor extension unnecessary in most kinds of service but that when conditions are such that the load must be disposed at a considerable distance from the rail the car can be equipped with aprons, if desired.

Dump Car Embodies New Features

THE MAGOR CAR Corporation, New York, has developed an automatic dump car known as the Type R, which is now being placed on the market after a number of years' study to perfect certain basic details of construction and operation. This car is built throughout of steel and is of 30 cu. yd. water level capacity with the body of such dimensions that it will take 42 cu. yd. of material without extra top boards.

The car is dumped by tilting the entire body to



The Magor Dump Car in Service on the Central Railroad of New Jersey

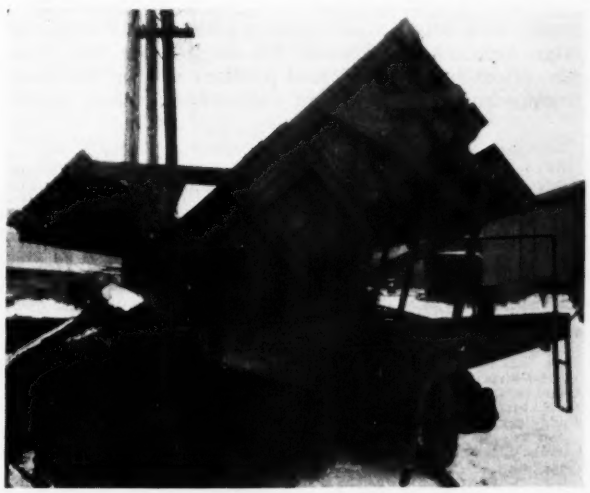
either side with doors that are lifted by an ingenious mechanical device as the body is tipped. When desired it is supplied with chutes which normally hang in a vertical position below the sides, but when the car body is tipped the chute or apron on the dumping side swings outward and serves the same purpose as an outward folding door to discharge the load clear of the track and ballast. A particular advantage claimed for the use of the apron operated in this manner is that when the car has been dumped the action of the chute mechanism is such as to withdraw the chute from under the dumped load, thus allowing the car to be righted without having to drag it clear. This allows the work train to move promptly as soon as the loads are dumped.

The clearance between the lifted door and the floor when the body is in the dumping position is 5 ft. 2 in., which is ample to clear practically any rock or other bulky object which would be loaded into the car by a steam shovel. As the car assumes the dumping position the travel of the door is outward and upward and insures that the door is well out of the way before the load begins to slide on the tilting floor and thereby guards against shock or strain which would occur if heavy masses in the load were thrown against the door. This eliminates one of the most potent sources of derailment.

In these cars the dumping cylinders are operated by air passing through special operating valves which in turn are operated by selective three-way valves in each

air line, which are located under the end platform of the car and controlled by hand rods extending to the outside edge of the platform to permit of complete control of the car by the operator without risk of accident. Several types of air operation are afforded the purchaser to suit his requirements. These include straight air operation from the locomotive as well as operation through a steel reservoir either in the train or on individual cars.

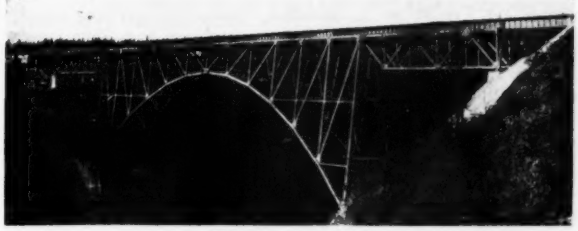
The Type R cars have a length over the end sills of 38 ft. 2 in. and an over-all width of 10 ft. 1¾ in. The inside dimensions of the car body are 34 ft. long by 8 ft. 11¼ in. wide by 2 ft. 8 in. deep. The floor is made of 5/16 in. plates reinforced by a covering of 2¾ in. planking to absorb the shock of material falling into it as the car is being loaded. The doors are of special design, having cast steel end brackets for the attachment of the operating bars. The car bodies are integral units and rest on eight cast steel supports in which the weight is not carried on pins but the bearing surface of the upper casting rests on hardened steel filler plates, allowing more perfect adjustment and longer life of the bearings.



The Type R Car in the Dumping Position

One feature which has been patented by the maker is a simple design of positive compression lock to prevent the dumping of the body except when required and to maintain the body in a firm position while in transit. This compression lock is automatically operated when the car body is released but firmly fixed when the car is in an upright position.

Cars of similar design are offered by the manufacturer in 20 cu. yd. capacity, known as the Type B, and in 12 cu. yd. capacity, under the name Type C, the general design being the same except that a single cylinder instead of two is provided on each side of the car.



Hurricane Gulch Arch on the Alaska Railway

With the Associations

American Railway Engineering Association

More than 20 of the standing committees of the association have already met and organized for their year's work, a record surpassing that of any previous year. The tie committee met in St. Louis on May 12, following which the members spent several days visiting tie treating plants at East St. Louis, Ill., Shreveport, La., and Texarkana, Tex. The committee also went into the woods to observe the production of ties at first hand and to investigate the extent to which its specifications are being adhered to.

Tentative plans are being made for the Board of Direction to meet at Montreal on June 24.

Maintenance of Way Club of Chicago

The last meeting prior to the summer recess was held at the Auditorium hotel, Chicago, on Wednesday evening, May 20, with approximately 60 members and guests present. J. B. Mabile, supervisor of work equipment of the Chicago, Rock Island & Pacific, presented a paper on the use and abuse of work equipment in which he made special reference to the increase in the amount and character of equipment now in use on the railways and discussed those measures which it is necessary to adopt to secure the most efficient result. This paper was discussed actively.

The Wood-Preservers' Association

As announced in the May issue, the Forest Products Laboratory of the Forestry Branch of the Canadian Department of the Interior has invited the officers of the American Wood Preservers' Association and the members of the Committee on Wood Preservation of the American Railway Engineering Association to hold their summer meeting in Montreal on July 8 and 9. The first day will be devoted to the meetings of these committees with a meeting in the evening to which officers of the Canadian Pacific and the Canadian National Railways and the Canada Creosoting Company will be invited. At this meeting short talks will be made by C. M. Taylor, superintendent, Port Reading Creosoting Plant, Port Reading, N. J., on the treatment of car material; L. C. Drefahl, Grasselli Chemical Company, Cleveland, Ohio, on the treatment of chloride of zinc with petroleum; R. S. Belcher, manager, treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan., on the treatment of ties in the United States, and E. T. Howson, editor, *Railway Engineering and Maintenance*, Chicago, on the part that the technical magazines have played in the development of timber preservtion. The following day will be spent with the officers of the Canadian Forestry Service in (1) the discussion of penetration and absorption tests on Canadian woods, (2) seasoning study of

maple ties with special reference to the moisture content when treated on checking after treatment, (3) the effect of crude oil creosote mixtures in preventing checking and (4) some tests to determine the value of Wolman Salts as a wood preservative. Following this meeting the pulp and paper division and the division of timber tests of the laboratory will be visited.

Directory of Associations

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, Buffalo, N. Y., October 20-22, 1925.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (Works in cooperation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Annual convention, Congress Hotel, Chicago.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—E. J. Stocking, secretary, Room 1146 Otis Bldg., Chicago. Next convention January, 1926, Cleveland, Ohio.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—B. J. Wilson, Pocket List of Railroad Officials, 605 Fischer Building, Chicago. Annual exhibit at convention of American Railway Bridge and Building Association.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—J. S. Penney, secretary, T. J. Moss Tie Company, St. Louis, Mo. Next convention January, 1926, Hot Springs, Ark.,

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, secretary, Seeberger Building, 825 South Wabash avenue, Chicago. Annual exhibition at convention of American Railway Engineering Association.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, secretary, B. & O., Pittsburgh, Pa. Next convention September 22-24, 1925, Kansas City Mo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Annual Exhibit at convention of Roadmasters' and Maintenance of Way Association.

The Meaning and Importance of My Job*

BY JOHN ALLINDER
Section Foreman, Kansas City Southern, Anderson, Mo.

MY JOB is a responsibility I give to the railroad company in the capacity of section foreman, and indirectly give to the public, together with my best energy, honestly applied to that job, in return for a compensation necessary to my support and welfare, paid me by the company.

I get bread and meat in return for energy and responsibility; substance for substance. In other words, I get out of it just what I put into it. The responsibility is placed upon me because I have been diligent in preparing myself to receive it, having advanced step by step to attain it, and I realize the greater my responsibility the greater my earning power, as a just reward and leading to future success, every good achievement being worth while.

The importance of my job is vouched for by the results obtained. The endless essentials for a perfect roadway, public safety, and commercial prosperity, make it extremely important that I leave no stone unturned in doing my full duty in a faithful and conscientious manner, justifying my work by my actions, and increasing my knowledge of the same. A thing left undone is a broken cog in a mammoth gear.

A thorough knowledge of my work is necessary, and this I have gained by endeavoring to be an apt student in the great school of experience. To continue to strive for increased knowledge and accomplishment is my aim. I appreciate my slight advantages, and shall endeavor to improve upon them.

*From the Maintenance of Way Bulletin of the Kansas City Southern.

The Material Market

THE predominating tendency in the market for iron and steel products during the month of May was a curtailment in production which had the effect of reducing the volume of output from an average of about 79 per cent of capacity in April to about 70 per cent in May. As regards sales, it is said that the number of orders placed is approximately the same as during the corresponding period last year, but the average quantity per order is considerably smaller. This tendency is particularly marked with respect to track materials. Some shading of prices has been noted, particularly in the case of wire products. The prices for structural material seems to have become rather thoroughly established at 2.0 cents a pound, Pittsburgh, for large orders and 2.1 cents for small quantities. Current prices for iron and steel products used in the maintenance and construction of railroads are given below:

PRICES PER 100 LB.

	April		May	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	$2.80 to $3.10	$3.00	$2.80 to $3.10	$3.00
Track bolts	3.90 to 4.25	4.00	3.90 to 4.25	4.00
Angle bars	2.75	2.75	2.75	2.75
Tie plates, steel	2.35 to 2.50	2.35	2.35 to 2.40	2.35
Boat spikes	3.25	3.25	3.25	3.25
Plain wire	2.50 to 2.60	2.70	2.50	2.60
Wire nails	2.75 to 2.85	2.95	2.75	2.85
Barb wire, galv.	3.55	3.65	3.45	3.55
C. I. pipe, 6 in. to 12. in, ton		46.70		46.70
Plates	2.00 to 2.10	2.20	2.00 to 2.10	2.20
Shapes	2.10	2.20	2.00 to 2.10	2.20
Bars, soft steel	2.10 2.10 to	2.20	2.00 to 2.10	2.10
Rivets, struct.	2.60	2.75	2.55 to 2.60	2.75
Conc. bars, billet	2.10		2.00 to 2.10	
Conc. bars, rail		2.10		2.10
Rail, per gross ton f. o. b. mills		43.00		43.00

The scrap market has experienced a change and prices are slightly on the upward trend, the quotations given below being the same or a little above those for the month of April.

PRICES PER GROSS TON AT CHICAGO

	April	May
Relaying rails	$26.00 to $31.00	$26.00 to $31.00
Rails for rerolling	16.00 to 16.50	17.00 to 17.50
Rails less than 3 ft. long	17.50 to 18.00	17.50 to 18.00
Frogs and switches cut apart	15.25 to 15.75	15.50 to 16.00
Steel angle bars	16.50 to 17.00	16.50 to 17.00

Curtailment of production in the lumber industry continues and there is now a talk of a 30-day closedown of the mills on the west coast for the purpose of keeping stocks within bounds until sales increase in volume. Conditions in the Southern Pine field seem more favorable from the standpoint of the producers but the table of prices given below indicate a continuing downward trend.

SOUTHERN PINE MILL PRICES

	April	May
Flooring, 1x4, B and B flat	$46.16	$44.76
Boards, 1x8, No. 1	36.06	35.87
Dimension, 2x 4, 16, No. 1, common	28.74	27.81
Dimension, 2x10, 16, No. 1, common	29.61	27.94
Timbers, 4x4 to 8x8, No. 1	29.18	27.89
Timbers, 3x12 to 12x12, rough		38.52

DOUGLAS FIR MILL PRICES

Flooring, 1x4, No. 2, clear flat	$35.00
Boards, 1x8, 6 to 20, No. 1, common	18.50
Dimension, 2x 4, 16, No. 1, common	19.50
Dimension, 2x10, 16, No. 1, common	19.00
Timbers, 6x6 to 8x8, No. 1, common	23.00
Timbers, 10x10 to 12x12, rough	18.00

No changes have been noted in the prices of Portland cement and the prices in terms per barrel, in carload lots, not including package given below are the same as those shown last month.

New York	$2.15	Minneapolis	$2.42
Pittsburgh	2.19	Dallas	2.05
New Orleans	2.40	Denver	2.84
Chicago	2.20	San Francisco	2.31
Cincinnati	2.47	Montreal	1.80

News of the Month

A court in Kentucky held that the movement of a flat car carrying a steam shovel is not so unusual or unnecessary as to make a railroad liable for injuries to a rider when his horse was frightened.

The annual meeting of the American Railway Magazine Editors' Association was held at the Hotel Rennert, Baltimore, Md., on May 1 and 2, 47 railroad publications being represented at the meeting, which was devoted to the discussion of important matters of policy involving the editing and publishing of these magazines.

The Delaware & Hudson has leased the Buffalo, Rochester & Pittsburgh for a period of 999 years under a plan that provides that the lessor will pay all fixed charges, assume maturing obligations and pay a rental sufficient to insure a six per cent dividend upon outstanding preferred and common stock.

An inquiry into the general railway situation in Canada by a special committee of the Canadian Senate was urged a few days ago by Senator David of Montreal, and his resolution calling for a special committee "to inquire into and report upon the best means to relieve the country from its heavy railway expenditure" has been adopted by the Senate.

A reduction in the rate to the employees of the Southern Pacific under the group life insurance plan, from 70 cents a month for each $1,000 of insurance, to 60 cents, has been made following the completion of the study of the first year's results. Death and disability claims of more than $1,000,000 were paid during the year 1924, the first in which the plan was in operation.

The American delegation to the International Railway Congress, which will be held in London from July 22 to July 26, insofar as has been ascertained, total 55 persons. This list includes goverment representatives and representatives of the American Railway Association and those railroads which are members of the congress. A considerable portion of those who are planning to attend the congress have already taken passage for England.

On Sunday, May 17, the main waiting room, concourse and baggage room of the new Chicago Union Station were placed in service, all of the station tracks of the south unit and a considerable portion of those in the north unit having been in use for some time. The completion of train sheds, restaurants, concession space and some of the interlocking and track work will require several months time, but it is planned to told a formal opening of the station early in July.

The western railroads have petitioned the Interstate Commerce Commission for an advance in rates which will yield a return to the carriers operating in the western district of not less than 5¾ per cent. In this petition, which is signed by 66 roads, including 6 that are now in the hands of receivers, the railroads called attention to the fact that their earnings in 1924 resulted in a net railway operating income of only $378,000,000, or a return of 3.87 per cent upon the book cost of road and equipment, including materials and supplies.

The number of employees reported by Class 1 railroads for February, 1925, was 1,725,366, a decrease of 2,967, or 0.2 per cent from the number reported for the previous month, according to the Interstate Commerce Commission's monthly bulletin of wage statistics. The total compensation decreased $19,488,816 or 8 per cent. This large decrease in compensation is due principally to the fact that there were only 23 working days in February, while January had 26. Compared with the returns for the same month last year, the employment shows a decrease of 1.6 per cent and the total compensation a decrease of 3.1 per cent There was one more working day in February, 1924, than in February, 1925.

One of the most recent developments in steam locomotive design is the use of three cylinders, all working under direct boiler pressure. The first of these was a 4-8-2 type belonging to the New York Central converted to the three cylinder type by the American Locomotive Company in 1922. The second was a new engine built for the Lehigh Valley in 1923. The results secured with these two locomotives were so satisfactory that since January, 1924, 39 three-cylinder locomotives were built and delivered to 12 different roads and 10 more are now under construction.

Operating revenues of the Class 1 railroads, having a total mileage of 236,550 miles, amounted to $486,484,801 in March, according to reports filed with the Interstate Commerce Commission and compiled by the Bureau of Railway Economics. This was a decrease of $18,886,586 or 3.7 per cent as compared with March last year. Operating expenses totaled $377,265,486, a reduction of $13,336,445 or 3.4 per cent, and the net railway operating income was $73,116,672, a decrease of $7,203,375. Maintenance of way expenditnres totaled $61,090,200, an increase of $1,486,400.

A contract for four electric locomotives and other equipment to be used in the electrification of the Great Northern's west approach to the summit of the Cascade mountains has been closed with the Westinghouse Electric & Manufacturing Company. This electrification project will extend from Skykomish, Wash., to the Cascade tunnel, about 24 miles, the line through the tunnel having been electrified some years ago. The work will be undertaken immediately and it is planned for completion within 12 months. The cost is estimated at approximately $1,000,000.

Studies of business conditions by the Car Service division of the American Railway Association have led to the conclusion that the railroad freight traffic during 1925 will equal if not exceed that of any previous year. It is estimated that the total loading of revenue freight for the year will approximate 50,500,000 cars, an increase of about 680,000, cars or 1.4 per cent over 1923, when more cars were loaded than ever before in any similar period. For the first 18 weeks of the present year, January 1 to May 2, inclusive, the total loading of all commodities amounted to 16,468,608 cars, an increase of 468,870 cars, or 2.9 per cent, over the corresponding period of last year and an increase of 425,985, or 2.7 per cent over the corresponding period of 1923.

A working model of a hump classification yard, constructed by students in the railway course in civil engineering, was displayed at the annual engineers' exhibit held in the engineering school of the University of Kansas recently. The track and equipment were constructed entirely by the students, including the molding of the wheels and the attachment of trucks to car bodies. The freight car bodies were 12 in. long, 3 in. wide and 3¼ in high. The track was made with 2⅛ in. gauge and spaced 5 in. centers, the rails being ¼ in. strips of wood tacked to a compo board base. Switches were of the form of the ordinary switch, switch points and frogs being of oak and the remainder of track material of light pine. Switches were thrown by an operator by means of a set of levers. In the two days this exhibit was in operation it was visited by about 5,000 people.

Labor News

General Conference at Cleveland

Plans for meetings of railway executives, the officers of the railway labor brotherhoods, members of railroad veterans' and pension associations and a number of prominent public citizens for the purpose of striking out existing points of dispute between railway managements and the employees are being formulated by William G. Lee, president of the Brotherhood of Raidroad Trainmen.

Santa Fe Organizes Maintenance of Way Company Union

Complaint was made to the labor board by the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers that the Atchison, Topeka & Santa Fe and affiliated companies were arranging to enter into negotiations with a committee representing the "maintenance of way and miscellaneous foreman, mechanics and helpers" on the Atchison, Topeka & Santa Fe system as a means of supplanting the representation of the United Brotherhood on that system, contending that this action was not in conformity with the spirit and intent of the Transportation Act of 1920. The decision of the labor board is that a secret ballot shall be taken to determine the proper representation for the track, bridge and building and miscellaneous foremen, bridge and building inspectors, etc., in the employ of the carriers, the procedure to be in conformity with that described in Decision No. 218.-Decision No. 3310.

Working Agreement Requested by Employees

An agreement is in effect covering working conditions and the establishment of certain rates of pay between the Brotherhood of Maintenance of Way Employees and Railway Shop Laborers and the Louisiana Railway & Navigation Company of Texas. But no such agreement exists between the brotherhood and the Louisiana Railway & Navigation Company of Louisiana, which is under the same management but is operated as a separate property. The carrier contends that no dispute or dissatisfaction exists on the Louisiana lines and that it does not know of any legal or authorized representative having been appointed by the employees. This case having been brought to the attention of the labor board the decision of the board is that conferences shall be held between the representatives of the parties in dispute and that if an agreement cannot be reached as to the right of representation a secret ballot shall be taken for the purpose of determining definitely the wishes of the employees of the maintenance of way department.—Decision No. 3327.

Three Roads Fail to Comply With Labor Board Decisions

Decisions have been rendered by the labor board with respect to three cases in which the board had previously rendered decisions concerning employees of the maintenance of way department but which the carriers in question have failed to observe. One of these cases involved the reinstatement of a pumper on the Denver & Salt Lake who lost his position through an arrangement for contracting the pumping; another involves the compensating of employees of the Chicago Great Western for time lost and the lower rate paid by a maintenance of way contractor, and the third concerns the reinstatement of a section foreman on the San Antonio, Uvalde & Gulf, whose position had been abolished. In the Great Western case the attorney for the railroad declared that the decision was void because of the want of power on the part of the labor board; while in the case of the San Antonio, Uvalde & Gulf the railroad declined to participate in any proceedings before the board because it is in the hands of a receiver and the decision of the board is contrary to the order of the court under whose jurisdiction the receiver is employed, and furthermore, because the section foreman has sued for his rights in the Federal court.

The decision of the labor board in each of these three cases is that the railroads are knowingly and willingly persisting in its violation in contempt of the decision and in contravention of public welfare.—Decision No. 3320, 3321 and 3322.

Personal Mention

General

I. A. Guier has been appointed supervisor of work equipment of the Atchison, Topeka & Santa Fe, eastern lines, with headquarters at Topeka, Kan.

W. H. Tobey, division engineer on the Western lines of the Canadian National, with headquarters at Prince Rupert, B. C., has been promoted to superintendent of the Smithers division, with headquarters at Prince Rupert, succeeding I. A. Macpherson, who was transferred to the Saskatchewan district.

G. D. Hughey, division engineer on the Delaware & Hudson at Oneonta, N. Y., has been promoted to superintendent of the Champlain division, succeeding H. M. Gargan, who has resigned. Mr. Hughey was born on December 7, 1884, at Oakmont, Pa., and was educated at the Pittsburgh high school and Rensselaer Polytechnic Institute, Troy, N. Y., entering railway service in 1910, in the engineering department of the Bessemer & Lake Erie, at Greenville, Pa. In 1913 he became an inspector in the engineering department of the Delaware & Hudson, and from this time until August, 1917, he held various positions in the engineering department. From August, 1917, to November, 1921, he was division engineer of the Champlain division, and from November, 1921, to May 1, 1925, he was division engineer of the Susquehanna division of the same road, which latter position he held at the time of his recent promotion.

Engineering

S. W. Leeper, division engineer on the Canadian National, with headquarters at Port Arthur, Ont., has been transferred to the Smithers division, with headquarters at Prince Rupert, B. C., succeeding **W. H. Tobey,** promoted to superintendent as noted elsewhere.

A. M. Clark, chief draftsman in the engineering department of the New York, Chicago & St. Louis, at Cleveland, Ohio, has been promoted to division engineer of the Ft. Wayne and Chicago divisions, with headquarters at Ft. Wayne, Ind., succeeding G. E. Potter, whose death was noted in the May issue.

A. H. Freygang, division engineer of the Baltimore & Ohio, with headquarters at Grafton, W. Va., has been transferred to Akron, Ohio, in charge of the Akron division, to succeed **E. J. Correll,** resigned, **G. M. Wakefield,** assistant division engineer of the Ohio division, with headquarters at Chillicothe, Ohio, has been appointed maintenance inspector on the staff of the chief engineer maintenance, with headquarters at Baltimore, Md. **R. W. Gilmore** has been transferred to Chillicothe, succeeding Mr. Wakefield.

J. L. Fergus, assistant division engineer on the Nashville, Chattanooga & St. Louis, with headquarters at Chattanooga, Tenn., has been promoted to the position of division engineer of the Chattanooga division, succeeding **J. L. Earls,** whose death is reported elsewhere in this issue. The position of assistant division engineer has been abolished. Mr. Fergus was born at Bellefontaine, Ohio, on June 20, 1890, and received his technical education at the Ohio State University. He entered railway service in the spring of 1911 as a rodman for the Louisville & Nashville at Poorfork, Ky., later being made masonry inspector, with the same headquarters. He was then transferred to the North Fork extension of the Lexington & Eastern, which was being constructed into the coal fields of eastern Kentucky. While on this work he was appointed instrumentman and in June, 1912, was promoted to assistant resident engineer at Athens, Ala., in connection with the reconstruction and double tracking of portions of the Louisville & Nashville. He served in various capacities on construction work until January 1, 1915, when he was transferred to the valuation department, where he was serving in March, 1915, when he was appointed assistant engineer on the Chattanooga division of the Nashville,

Chattanooga & St. Louis. With the exception of short periods when he served as supervisor of track, resident engineer in the real estate department, he held this position continuously until the illness of Mr. Earls led to his appointment to the temporary position of assistant division engineer.

F. P. Gutelius, Jr., division engineer of the Delaware & Hudson, at Plattsburg, N. Y., has been transferred to Oneonta, N. Y., succeeding **G. D. Hughey,** promoted, as noted elsewhere. **W. J. H. Manning,** assistant engineer maintenance of way, has been appointed division engineer at Plattsburg, succeeding Mr Gutelius, and **P. O. Ferris,** roadmaster at Carbondale, Pa., has been promoted to assistant engineer maintenance of way, with headquarters at Albany, succeeding Mr. Manning. Mr. Manning was born at Omaha, Neb., on June 24, 1891, and was graduated from Rensselaer Polytechnic Institute in 1911. He entered railway service on July 1 of the same year with the Delaware & Hudson and from that time until September 1, 1917, held various positions in the engineering and valuation departments. He then entered the United States Army as a lieutenant in the Transportation Corps, serving in the A. E. F. with the 52nd Engineers. Following his discharge from the army he returned to the employ of the Delaware & Hudson on July 21, 1919 and subsequently served in various positions in the valuation and accounting departments. On November 1, 1921, he was promoted to assistant engineer, maintenance of way, with headquarters at Albany, the position he held at the time of his recent promotion to division engineer, as noted above.

G. H. Wilsey, principal assistant engineer of the St. Paul Union Depot Company at St. Paul, Minn., has been promoted to chief engineer, with the same headquarters, succeeding Frederick Mears, whose appointment as assistant chief engineer of the Great Northern is reported elsewhere in these columns. Mr. Wilsey was born on November 28, 1885, at Lena, Ill., and graduated from the Armour Institute of Technology in Chicago, in 1908. He entered railway service in that year as a draftsman in the bridge department of the Chieago, Milwaukee & St. Paul and two years later was employed in a similar capacity in the bridge department of the Chicago & North Western. Mr. Wilsey left railway service in 1911 to become a structural designer for D. H. Burnham & Co., architects, of Chicago. He was appointed a structural draftsman with the St. Paul Union Depot Company in 1915, leaving that position a year later to become structural draftsman for the Toltz Engineering Company. He was appointed structural engineer of the St. Paul Union Depot Company in charge of design and structures in 1917 and was promoted to principal assistant engineer in 1923. Mr. Wilsey held that position until his recent promotion to chief engineer.

J. R. W. Davis, engineer maintenance of way of the Great Northern, with headquarters at St. Paul, Minn., has been promoted to chief engineer, with the same headquarters, succeeding **A. H. Hogeland,** who has been appointed consulting engineer. **Col. Frederick Mears,** chief engineer, St. Paul Union Depot Company, has been made assistant chief engineer of the Great Northern, with headquarters at Seattle, Wash., succeeding **O. S. Bowen,** who has been appointed assistant to the chief engineer, with headquarters at St. Paul, Minn., a newly created position. **H. F. Hamilton,** district engineer of the Eastern district of the Great Northern, with headquarters at St. Paul, Minn., has been promoted to assistant to the chief engineer. **H. J. Seyton,** district engineer of the aLke district, with headquarters at Duluth, Minn., has been given jurisdiction over the Eastern district also, succeeding Mr. Hamilton.

Mr. Hogeland was born on January 10, 1858, at Southampton, Pa., and graduated from Lafayette College, Eaton, Pa., in civil engineering in 1877. He entered railway service two years later as a rodman on the construction of the St. Paul & Pacific, and after serving in that capacity and as a levelman until September of that year, he was employed as a levelman on the survey of a new railroad between St. Paul and Chicago. From April, 1880, to February, 1882, he served as a levelman, transitman and typographer on the location of the Yellowstone and Rocky Mountain divisions of the Northern Pacific. His next position was that of assistant engineer on the construction of the Bozeman tunnel, which he retained until April, 1884, when he became assistant engineer on the construction of the North Dakota, St. Paul, Minneapolis & Manitoba Railroad. From September, 1884, to June, 1885, he was assistant engineer on the construction of the Wisconsin division of the Northern Pacific. On the latter date he entered the service of the St. Paul, Minneapolis & Manitoba, now the Great Northern, as an assistant engineer of construction and maintenance. He continued in this position until September, 1890, when he was promoted to engineer maintenance of way of the Eastern district, a position he held until August, 1896, when he became resident engineer on the same district. On March 1, 1902, he was promoted to assistant chief engineer and one year later was promoted to chief engineer. This position he held until February 15, 1913, when he was appointed consulting engineer, a position he held until May 1, 1914, when he was again appointed chief engineer, the position he held at the time of his recent re-appointment as consulting engineer.

Mr. Davis was born on October 26, 1868, and graduated from Lehigh University in 1891. He entered railway service in July of that year as a rodman on the New York, Lake Erie & Western, now a part of the Erie, and in April, 1892, was promoted to assistant supervisor. He was promoted to assistant engineer in December, 1892, and held that position until February, 1898, when he was promoted to division engineer on the Chicago & Erie. Mr. Davis was promoted to engineer maintenance of way of the Erie in April, 1900. He was appointed engineer maintenance of way of the Chicago & Alton in January, 1901, where he remained until November, 1901, when he returned to the Erie as engineer maintenance of way. Mr. Davis was appointed engineer maintenance of way of the Great Northern in September, 1903, which position he held until his promotion to chief engineer.

Col. Mears was born on May 25, 1878, at Omaha, Neb., and was educated at the Shattuck (Minn.), Military Academy, and in 1895 attended the U. S. Staff College at Fort Leavenworth, Kan. He entered railway service in June, 1897, and was engaged consecutively on the survey and construction of the Park Rapids extension of the Great Northern, the location and survey of the Coon creek cutoff, and as assistant engineer on the Kootenai Valley (now a part of the Great Northern) until 1899. He entered the U. S. Army in 1905 and in May, 1906, was appointed assistant engineer of the Isthmian Canal Commission at Panama, a position he held until May, 1907, when he was appointed resident engineer of the Panama Railroad. In December, 1909, he became chief engineer and in 1913 was also made general superintendent. Having been appointed a member of the Alaskan Engineering Commission in May, 1914, he ultimately relinquished his connection with the Panama Railroad to devote all of his time to the commission work. Reentering military service in 1918, he served both in the United States and in France as an assistant general manager of the railroad department until May, 1919. In August, 1919, he was appointed chairman and chief engineer of the Alaskan Engineering Commission and in September, 1923, was appointed chief engineer of the Union Depot Company, St. Paul, Minn., which position he was holding at the time of his recent appointment.

Col. Frederick Mears

M. Donahoe, general roadmaster of the Chicago & Alton with headquarters at Bloomington, Ill., has been promoted to general supervisor of maintenance, in charge of the maintenance of roadway, bridge and buildings and signals, with headquarters at Chicago, a newly created position. Mr. Donahoe entered the service of the Alton in 1888 and was

promoted to foreman at Alton, Ill., in 1891. He was promoted to assistant roadmaster in July, 1899, and was promoted to supervisor of track in 1900. Mr. Donahoe was promoted to division roadmaster in 1910 and was promoted to general roadmaster in 1915. He continued in that position until his recent promotion to general supervisor of maintenance.

B. H. Prater, whose promotion to assistant chief engineer of the Oregon Short Line, with headquarters at Salt Lake City, Utah, as reported in the May issue, was born on November 11, 1881, at Bingham, Ill., and graduated at the University of Illinois as a civil engineer in 1903. During 1903 and 1904 he was engaged in work as an instructor in the surveying and masonry laboratory and assistant in bridge design at the University of Illinois. He was first employed in railway service as a track apprentice on the Illinois Central during the summer vacations while attending the university, during which periods he also served as a shop apprentice in the Illinois Steel Company and as a clerk in the American Bridge Company. Mr. Prater was employed as a transitman on the Panama canal during 1904 and 1906. He entered the service of the Oregon Short Line in the latter year as a draftsman and was subsequently promoted to chief draftsman, office engineer, and engineer of buildings. In 1918 he left railway service to become manager of the supply division of the Chester Shipbuilding Company, Chester, Pa., but on May 12, 1919, he returned to the Oregon Short Line as engineer maintenance of way, with headquarters at Pocatello, Idaho. Mr. Prater held that position until his recent promotion to assistant chief engineer.

B. H. Prater

R. L. Adamson, whose promotion to division engineer on the Los Angeles division of the Union Pacific, was reported in the April issue, entered the service of the Union Pacific in 1910, as a draftsman in the chief engineer's office at Omaha, Neb. From 1912 to 1915 he held various positions in the valuation department and in the chief engineer's office, and also served as a draftsman in the bridge engineer's office. He served as an engineer on construction and maintenance on the Wyoming division, later having charge of the construction of terminals at Kansas City, Mo., and Council Bluffs, Iowa, also the construction of bridges on the Oregon-Washington Railroad & Navigation unit of the system. In February, 1923, he took charge of the construction of the east yard terminal, Los Angeles, serving in that capacity until November, 1924, when he was placed in charge of the construction of tourist facilities in Southern Utah, with headquarters at Cedar City, Utah, which position he was holding at the time of his recent promotion.

R. L. Adamson

Track

J. O. Johnson Jr. has been appointed roadmaster on the Southern Pacific, Pacific system, with headquarters at Ashland, Ore., succeeding **T. Connor,** transferred.

I. J. Holder has been appointed track supervisor on the Southern, with headquarters at Birmingham, Ala., to succeed **J. B. Austin,** assigned to other duties.

J. N. Sagester, track foreman on the Pennsylvania, has been promoted to track supervisor on the Logansport division, with headquarters at Logansport, Ind., succeeding **John Bowen,** who has been assigned to other duties.

D. B. Cellar, assistant on the engineering corps, Eastern division, of the Pennsylvania, has been promoted to assistant main line supervisor of the Pittsburgh division, with headquarters at East Liberty, Pa., to succeed **D. W. Weaver,** who has been granted a leave of absence because of ill health.

J. Graham, roadmaster on the Mountain West territory of the Canadian Pacific, has been transferred to the Shuswap East territory, to succeed **G. A. Delacherois,** whose death is reported elsewhere in this issue. **H. R. Younger,** transitman at Vancouver, B. C., has been appointed roadmaster on the Mountain West territory, succeeding Mr. Graham.

James A. Gard, whose promotion to roadmaster on the New York, Chicago & St. Louis, with headquarters at Bloomington, Ill., was reported in the May issue, was born on December 31, 1892, at Paulding, Ohio. He entered railway service as a track laborer on the New York, Chicago & St Louis in February, 1916, holding this position until April, 1919, when he became a track foreman, which position he held until August, 1923. On the latter date he was promoted to general foreman, which position he was holding at the time of his recent promotion to roadmaster.

W. M. Gates, whose promotion to roadmaster on the Gila district of the Southern Pacific, with headquarters at Gila, Ariz., was announced in the April issue, was born in Lytle, Tex., in 1897. He received his education at San Marcos Academy, San Marcos, Tex., and Britton College, Cisco, Tex. His first railroad experience was obtained during the world war, in track maintenance and construction carried on by the American forces in France. Upon his discharge from the Army in 1919 he was employed as a laborer on the Southern Pacific, at Wellton, Ariz., holding this position until August, 1919, when he became section foreman. He served in this capacity on various sections until the time of his recent promotion to roadmaster.

Thomas Stang, supervisor of bridges and buildings of the Dakota division of the Northern Pacific, has been appointed roadmaster of the Fargo division, with headquarters at Fargo, N. D. **John Nester,** roadmaster on the Minnesota division, has been transferred to the Fergus Falls branch, Fargo division, with headquarters at Fergus Falls, Minn. **P. J. Carney,** roadmaster on the Minnesota division, has been transferred to the Red River and Red Lake Falls branches, with headquarters at East Grand Forks, Minn. **Hans Olson,** roadmaster on the Minnesota division at Staples, Minn., has been transferred to the first sub-division, main line, of the Fargo division, with the same headquarters. **F. J. Challoner,** roadmaster at Fargo, N. D., has been promoted to division roadmaster with the same headquarters, a newly created position. Mr. Challoner was born on September 27, 1889, at Crystal Springs, N. D., and entered railway service in 1906 in the engineering department of the Northern Pacific serving on that and other roads as chainman, rodman and instrumentman, respectively. In 1913 he became assistant engineer on maintenance on the Northern Pacific, holding this position until 1916 when he was promoted to roadmaster. He served with the Sixteenth Regiment of Engineers in the United States Army from 1917 to 1919, when he returned to the Northern Pacific as roadmaster, which position he was holding at the time of his recent promotion.

Herbert Fisher, assistant engineer on the Austin division of the Southern Pacific, has been transferred to Ennis, Tex., succeeding **John A. Gude,** whose promotion to roadmaster on the Southern Pacific, Texas lines, with headquarters at Dallas, Tex., was announced in the May issue. Mr. Gude was

born on July 24, 1895, at Amsterdam, Holland. He received his engineering education both through a course at the International Correspondence School and private instruction. He was employed as a draftsman for the Texas Power & Light Company at Dallas, Tex., from November 1, 1916, to March 1, 1918, at which time he became resident engineer in charge of sewer construction at Mercedes, Tex. He entered railway service on September 1, 1918, as rodman and instrumentman on the Dallas Belt line, which position he held until October 1, 1918, when he became instrumentman on the Houston & Texas Central, a subsidiary of the Southern Pacific, at Ennis, Tex. He left the railroad to become a highway engineer at Cooper, Tex., on January 1, 1919, which position he held until March of that year, when he became a special draftsman for the South West Telephone & Telegraph Company at Dallas. He returned to railway service on April 1, as an instrumentman on the Houston & Texas Central, at Ennis, Tex., holding this position until October 1, when he was promoted to assistant engineer, with the same headquarters, at which time he was also in charge of the work in the oil fields at Mexia and Wortham, with the title of resident engineer. He was holding the position of assistant engineer at the time of his recent promotion to roadmaster.

Bridge and Building

A. F. Ainslee has been appointed assistant supervisor of bridges and buildings of the Northern Pacific, with headquarters at Dilworth, Minn. **James Hartley,** supervisor of bridges and buildings of the Minnesota division, has been appointed supervisor of bridges and buildings of the Fargo division, with headquarters at Dilworth, Minn., succeeding **R. P. Seitz,** who has been appointed assistant supervisor of bridges and buildings of the Montana division, with headquarters at Livingston, Mont. **E. M. Grime,** supervisor of bridges and buildings at Fargo, N. D., has been appointed supervisor of bridges and buildings of the Dakota division, with headquarters at Jamestown, N. D.

H. E. Jackman has been promoted master carpenter on the Ohio division of the Baltimore & Ohio, with headquarters at Chillicothe, Ohio, succeeding **J. B. Clarke,** who has been granted a leave of absence because of illness. Mr. Jackman was born at Byer, Ohio, on March 10, 1888, and entered railway service on October 10, 1906, as an extra gang laborer on the Baltimore & Ohio, which position he held until September 15, 1907, when he became a mason helper in the bridge and building department. In 1913 he became gang foreman, holding this position until March 1, 1914, when, because of a reduction in forces, he was reduced to a position in one of the bridge gangs, where he remained until 1917, when he served as falsework inspector on construction. On May 1, 1919, he was again made bridge foreman and was holding this position at the time of his recent promotion.

Purchasing and Stores

F. C. Warren, general storekeeper of the St. Louis Southwestern, with headquarters at Tyler, Texas, has been transferred to Pine Bluff, Ark., succeeding **E. R. Bernhardt,** resigned. **G. F. Battenfield** has been appointed general storekeeper at Tyler, succeeding Mr. Warren.

Obituary

G. A. Delacherois, roadmaster on the Canadian Pacific, died at Revelstoke, B. C., on May 1.

Walter Shropshire, supervisor of bridges and buildings on the New Orleans division of the Yazoo & Mississippi Valley, with headquarters at Vicksburg, Miss., died after a lingering illness on May 19.

E. H. Bowser, superintendent of ties and treatment of the Illinois Central, with headquarters at Memphis, Tenn., was drowned in the Mississippi river on May 8 with 21 other persons following the capsizing of a government steamer, upon which a party of engineers attending the Mid-South Engineering Association convention at Memphis were making an excursion. The accident occurred on the return trip from an inspection of government engineering work on Cow Island. Mr. Bowser was born on January 13, 1856, at Louisville, Ky., and attended Vanderbilt University from 1878 to 1883. He entered railway service in October of the latter year on the Cincinnati Southern, now a part of the Southern railway system, where he remained until 1896, when he entered the service of the Illinois Central. In July, 1899, he was appointed assistant engineer on the Louisville & Nashville where he was subsequently promoted to special engineer, roadmaster, and superintendent in charge of creosoting work. Mr. Bowser returned to the Illinois Central in January, 1906, as superintendent of the timber department, with headquarters at Memphis, Tenn., his title later being changed to superintendent of ties and treatment.

J. K. Conner, chief engineer of the Nickel Plate and the Lake Erie and Western districts of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, died at Wabash, Ind., on May 18. Mr. Conner was born on April 12, 1871, at Wabash, Ind., and graduated at Rose Polytechnic Institute in 1891. He entered railway service in June, 1895, as an assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis and was promoted to supervisor of track in January, 1899. In July of that year Mr. Conner was appointed assistant engineer on the Baltimore & Ohio, where he remained until April, 1900, when he was appointed assistant engineer on the New York Central. He was appointed designer and draftsman in the bridge department of the Lake Shore & Michigan Southern, now a part of the New York Central, in 1901, and in March, 1903, was appointed division engineer of the Lake Erie, Alliance & Wheeling, now a part of the New York Central. Mr. Conner was appointed assistant engineer on the Lake Shore & Michigan Southern in September, 1905, and in April, 1906, entered the service of the Lake Erie & Western as first assistant engineer. He was promoted to chief engineer in February, 1914, and held that position until the Lake Erie & Western was made a part of the New York, Chicago & St. Louis, when he was appointed chief engineer of the Lake Erie and Western district. Mr. Conner's jurisdiction was extended over the Nickel Plate district last year.

J. L. Earls, division engineer on the Chattanooga division of the Nashville, Chattanooga & St. Louis, with headquarters at Chattanooga, Tenn., died on May 3 after an illness of several months. Mr. Earls was born near Beach Grove, Tenn. on April 10, 1870, and entered railway service in the bridge department of the Nashville, Chattanooga & St. Louis on July 1, 1888, where he remained five years, during which time he took a course with the International Correspondence School in bridge and civil engineering. In 1896 he was promoted to bridge foreman on the Huntsville division, where he remained until 1898, when he was transferred to the Chattanooga division. In the spring of 1902 he was promoted to bridge supervisor on the Huntsville division, holding this position for two years when he was again transferred to the Chattanooga division, his jurisdiction being later extended over the Atlanta division. In May, 1917, he was promoted to division engineer of the Chattanooga division, with headquarters at Nashville, Tenn., where he remained until May, 1919, at which time he was transferred to Chattanooga and his jurisdiction extended to include the Atlanta division. Two years later he was relieved of the jurisdiction of the Atlanta division, and was holding the position of division engineer at Chattanooga at the time of his death.

An entirely new type of locomotive, built by the Lima Locomotive Works, has recently been placed in service on the Boston & Albany. It is a 2-8-4 type, in other words a modification of the Mikado type by provision for two trailing axles instead of one. One of the particular advantages which it is expected to gain through this change is a better distribution of the load on the trailing truck. With two axles instead of one, the load per axle is less and the spacing of axles is closer, thereby overcoming the objections noted in many types of locomotives subjected to tests by the Joint Committee on Stresses in Track, which disclose the fact that the stresses in rail under trailer wheels are excessively high.

Construction News

The Ann Arbor has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a 400-ton two-track coaling station at Frankfort, Mich.

The Atlantic Coast Line has awarded a contract to the Roberts & Schaefer Company, Chicago, for 500-ton reinforced concrete coaling stations at Petersburg, Va., and Fayetteville, N. C., for a 250-ton coaling station at Trilby, Fla. and for two cinder plants at Uceta, Fla.

The Atchison, Topeka & Santa Fe is calling for bids for the construction of a 12-stall reinforced concrete enginehouse, foreman's office and lavatory building at Hutchinson, Kan. A contract has been awarded to the Roberts & Schaefer Company, Chicago, for the construction of a 300-ton reinforced concrete coaling station at Hutchinson. This company has awarded a contract for the construction of a tender repair shop at Albuquerque, N. Mex. A contract has also been awarded to Sharp & Fellows, Los Angeles, Cal., for the construction of a 65-mile branch line from Doud, Texas, west to the Texas-New Mexico state line, the plans for which were reported in the March issue. This company has awarded a contract to Sprague & Nisely, Beatrice, Neb., for the construction of a 56-mile extension from Elkhart, Kan., southwesterly into Texas county and Cimarron county, Okla., authorization for which was reported in the May issue. The contract includes the grading, track laying and the construction of all necessary buildings and other facilities except bridges. A sub-contract for the construction of buildings, including station, section houses and water stations has been awarded to Joseph E. Nelson & Sons, Chicago.

The Baltimore & Ohio has awarded a contract to George F. Dobbin, Philadelphia, Pa., for the reconstruction of a highway span over the railroad company's tracks at Twenty-fourth and Market streets, Philadelphia, to cost approximately $27,000, the expense of which will be partly borne by the City of Philadelphia. This company closed bids on May 26 for the construction of five water treating plants with tanks and pipe lines at Pittsburgh, Pa.

The Boston & Albany has awarded contracts for the new union station at Springfield, Mass., as follows: for plumbing and drainage, to the W. G. Cornell Company, Boston; for electrical work, to the Interstate Electric Construction Corp., Springfield; for the construction of new station, to J. Henry Miller, Inc., Baltimore, Md.; for heating and ventilating work, to the Hampen Plumbing & Heating Co., Springfield.

The Canadian National's two branch line bills which were passed by the House last session but rejected by the Senate have been reintroduced in the House of Commons at Ottawa by George P. Graham, Minister of Railways and Canals. One is for the Turtleford branch in Saskatchewan with a mileage of 67 and an estimated total cost of $1,871,000, and the other is for the Sunnybrae line in Nova Scotia with a mileage of 67 and an estimated cost of $3,500,000.

The Chesapeake & Ohio has applied to the Interstate Commerce Commission for authority for the construction and operation of an extension of its Logan division from Gilbert to Mullens, W. Va., 47.3 miles, and an extension of its Winding Gulf branch from Stone Coal to Mullens, 8.2 miles. This company awarded a contract to Joseph E. Nelson & Sons, Chicago, for the construction of terminal facilities, including a roundhouse, machine shop, power house and storage house at Russell, Ky., reported in the April issue.

The Chicago & Western Indiana has taken bids for the construction of extensions to the pipe lines at the Fifty-first street coach yard, Chicago, and at Ninety-fourth street and Manistee avenue, South Chicago.

The Chicago, Burlington & Quincy has awarded a contract to the Burrell Engineering & Construction Company, Chicago, for the construction of a grain elevator at St. Joseph, Mo., to cost approximately $200,000. A contract has also been awarded to the Kelly-Atkinson Construction Company, Chicago, for the construction of a viaduct over the tracks of the Burlington, the Chicago, Rock Island & Pacific, and the Atchison, Topeka & Santa Fe at Sixth street, St. Joseph, Mo. Contracts for the construction of approaches to the viaducts were awarded to the Land Construction Company, St. Joseph, Mo. The viaduct will be of reinforced concrete and steel construction and will cost a total of $131,000, which cost will be divided among the railways and the city of St. Joseph.

The Chicago, Milwaukee & St. Paul has received authorization from the Federal court at Chicago for the expenditure, by the receivers, of $1,500,000 for the construction of an engine terminal at South St. Paul, Minn. The terminal will include an enginehouse, repair shops, store buildings and related facilities. A large classification yard will be included in the project and this will require a large amount of filling in of land, the earth to be dredged from the river. Plans for the terminal are now being completed.

The Chicago, Rock Island & Pacific has awarded a contract to the Flick Construction Company, Chicago, for the grading in connection with the construction of second track from Latimer, Kan., to Dwight, 19 miles, authorization of which was reported in the March issue. This company has also awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the construction of a water station, including pumping plant, treating plant and pipe lines, at Pratt, Kan., to cost approximately $75,000.

The Cowlitz, Chehalis & Cascade has received permission from the Interstate Commerce Commission to extend its line from its terminus at Lacamas, Ore., southeasterly, 14 miles in Lewis county at a cost of approximately $386,680. Work must begin by July 1, 1925, and be completed by June 30, 1926. Permission to retain excess earnings was denied.

The Florida East Coast will request bids for the construction of a pumping station at Taylor creek, Fort Pierce, Fla., to have a capacity of 850 gal. per min. The work will include the construction of a 12-in. pipe line. This road is also making extensions of a number of passing tracks to provide capacity for 110 car trains. The Interstate Commerce Commission has authorized the construction of a cut-off which this company proposes to build from St. Augustine, Fla., to Bunnell (29 miles) which will reduce the company's main line mileage for through traffic by 19.4 miles. The cost of the work is estimated at $2,760,000.

The Illinois Central has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the construction of a 330-ton reinforced concrete coaling station at Sioux City, Iowa, to cost $55,000. This company has awarded contracts to Joseph E. Nelson & Sons, Chicago, for the construction of a water treating plant of 30,000-gal. per hour capacity at Sioux City, for the erection of 8,000-tons of structural steel for its locomotive and car repair shops at Paducah, Ky., and for the construction of a 48-stall roundhouse and machine shop at Markham yards, Chicago, reported in the February issue.

The Louisville & Nashville has applied to the Interstate Commerce Commission for an extension of time to December 31, 1925, in which to file its application for a certificate for the construction of the proposed connections between its McRoberts line and its Harlan county branch and the Carolina, Clinchfield & Ohio, which was one of the conditions on which the commission authorized the acquisition by the Atlantic Coast Line and the Louisville & Nashville of control of the C. C. & O.

The Los Angeles & Salt Lake has been granted authority by the Railroad Commission of California for the construction of a viaduct over Dominguez street, in Los Angeles harbor district. The viaduct will cost $535,000, to be divided between the municipalties and the railway.

The Maine Central closed bids on April 29 for the construction of a freight car repair shop at Waterville, Me., to cost approximately $47,000, to replace a building destroyed by fire.

The Missouri Pacific has awarded a contract to Winston Brothers, Minneapolis, Minn., for the construction of 30 miles of second track between St. Louis, Mo., and Jefferson City, at an estimated cost of $2,000,000. This project is part of the general plan to double track the entire line between St. Louis and Kansas City, which is to be completed within the next

five years at a cost of $15,000,000. This company closed bids on May 26 for the construction of a 10-stall roundhouse at Ewing avenue, St. Louis, Mo.

The New York, New Haven & Hartford has awarded a contract to the Lathrop & Shea Company, New Haven, for the elimination of a grade crossing at Bridge street, Middletown, Conn., to cost approximately $228,400.

The Northern Pacific closed bids on May 15 for the construction of a commissary building and coach yard facilities at St. Paul, Minn.

The Oregon Trunk has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Bend to Klamath Falls, Ore., 170 miles, and another line from a connection with it at a point 65 miles from Bend in a southwesterly and southerly direction to Klamath Falls, 80 miles, at an estimated cost of $6,500,000.

The Pennsylvania has awarded a contract to the James McGraw Company, Philadelphia, for the completion of the railroad's engine house facilities at Stony Creek, Thurlow, Pa., at an estimated cost of $100,000.

The Reading has awarded a contract to the Roberts & Schaefer Company, Chicago, for a four-track locomotive coaling station of 1,000-ton coal capacity, with a 375-ton sand bin. The structure will be of reinforced concrete construction throughout, with duplicate automatic electric skip elevating equipment and will be constructed at Reading, Pa. This company has also awarded a contract to the Fegles Construction Company, Ltd., Minneapolis, Minn., for the construction of a reinforced concrete grain elevator at Twentieth street and Pennsylvania avenue, Phildelphia. A contract for grading and masonry in connection with a change in the channel of Mahoning creek at Mausdale, Pa., has been awarded to Thomas B. Evans, Danville, Pa.

The San Antonio & Aransas Pass has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Falfurrias, Tex., to the international boundry line at a crossing of the Rio Grande river, 90 miles.

The Waco, Beaumont, Trinty & Sabine has received authority from the Texas Railroad Commission for the amendment of its charter to provide for the construction of an extension from Livingston, Texas, to Beaumont, and thence to Port Arthur. Authority has also been granted for the purchase of the Trinity & Sabine and the Gulf, Beaumont & Great Northern with which the proposed extension will connect.

The Wabash will soon close bids for the construction of three reinforced concrete coaling stations, one at St. Louis, Mo., another at Bement, Ill., and another at Tracey, Ia. These were reported in the April issue. This company closed bids on May 21, for the construction of a storehouse at Landers yards, Chicago.

The Singer Manufacturing Company, Ottawa, Ont., will shortly ask for bids for the construction of a 32-mile, standard-gage line in the Province of Quebec.

Equipment and Supplies

The Canadian National is inquiring for one 20-ton and one 25-ton locomotive crane.

The Chesapeake & Ohio is inquiring for one 5-ton and one 10-ton locomotive crane.

The Michigan Central is inquiring for 11,000 tons of structural steel.

The Litchfield & Madison has ordered 2,000 tons of rails and 500 tons of angle bars, bolts and spikes from the Inland Steel Company.

The Chesapeake & Ohio is inquiring for 1,300 tons of tie plates.

The New York Central has awarded contracts for tie plates for 105-lb. rail weighing 13-lb. each. This order has been divided approximately equally among the **Bethlehem Steel Corporation**, the **Illinois Steel Company** and the **Jones & Laughlin Steel Company** and will total from 6,500 tons to 9,750 tons. This road has also awarded a contract to the **Bethlehem Steel Corporation** for tie plates for 127-lb. rail which will total from 1,085 tons to 1,330 tons.

Supply Trade News

General

The Browning Crane Company is the new name adopted by the Browning Company, Cleveland, Ohio, makers of locomotive cranes and buckets.

The Orton & Steinbrenner Company, Chicago, has appointed the **Lincoln Products Corporation** its representative at 320 Market street, Newark, N. J., and at 30 Church street, New York.

The Austin Company, engineers and builders, with headquarters at Euclid Ave., Cleveland, has moved its New York office to the Equitable building, 120 Broadway. The New York staff has been increased.

The Timken Roller Bearing Company, Canton, Ohio, has bought the physical assets of **The Gilliam Manufacturing Company**; the production of both Timken bearings and Gilliam bearings will be continued in their respective plants.

The Davis Equipment Company and **M. E. Davis**, dealers in railroad and construction equipment, have removed their offices from 50 Church street to 8 West Fortieth street, New York City.

The Harnischfeger Corporation, Milwaukee, Wis., has opened a branch office at 431 First National Bank building, Birmingham, Ala., in charge of **James Van Buskirk**, who has been transferred from the company's office at Detroit, Michigan.

The Industrial Works, Bay City, Mich., has opened a district office at 425 Whitney Central building, New Orleans, La., in charge of **John A. Abele**, district sales manager, and another at 843-A Hurt building, Atlanta, Ga., in charge of **John J. Murphy**, district sales manager. **Douglas J. Calder, Conway J. Neacy** and **Monroe J. Frankel** have been appointed district sales engineers, with headquarters at Chicago. **Chester F. Delbridge** has been appointed district sales engineer, with headquarters in the Railway Exchange building, St. Louis, Mo.

The American Manganese Steel Company has just completed and placed in operation a foundry for the manufacture of Amsco manganese steel castings at Los Angeles, Cal., supplementing its foundries already in operation at Chicago Heights, Ill., New Castle, Del., St. Louis, Mo., Denver, Colo., and Oakland, Cal. This foundry is of steel construction throughout with corrugated iron roof and metal sash inside walls and is equipped with modern machinery for the production of manganese castings in quantity. The completion of this foundry increases the production facilities of this company to 25,000 tons of manganese steel castings annually.

Personal

H. W. Redman has been appointed manager of the Chicago office of the **Koppel Industrial Car & Equipment Company.**

G. R. Hanks, superintendent of the High Bridge plant of the **Taylor-Wharton Iron & Steel Company**, High Bridge, N. J., has been promoted to assistant to the president with full charge of all sales, in consequence of the resignation of **G. R. Lyman**, general sales manager. **Stanley Apcar** has been appointed plant superintendent.

Earl E. Miller, representative of the **Sullivan Machinery Company**, has been promoted to manager of the El Paso, Tex., branch office to succeed **R. S. Weiner**, who has been transferred to Chicago. The office of this company at Dallas, Tex., has been removed from the Western Indemnity building to the Santa Fe building, rooms 522 and 523.

William H. Reaves has been appointed southwestern sales agent of **The National Lock Washer Company**, Newark, N. J., in charge of the sales of lock washers, nut locks and spring washers. Mr. Reaves was formerly connected with the Chicago, Rock Island & Pacific at Chicago, and later at Little Rock, Ark. He was subsequently appointed southwestern sales agent for the P. & M. Company, with head-

quarters at St. Louis. In January, 1924, he became secretary and treasurer of the Railway Equipment Company of St. Louis and on April 1, 1925, severed his connection with that company to form the William H. Reaves Supply Company. Mr. Reaves will continue to handle the accounts of the P. & M. Company and the Maintenance Equipment Company in St. Louis and the southwest.

Joseph J. McGarrigle has been appointed eastern manager of the **Clark Car Company,** succeeding **B. K. Mould,** resigned. His headquarters are at 52 Vanderbilt avenue, New York City. Mr. McGarrigle graduated in civil and structural engineering from the Pennsylvania State College in the class of 1914. He served in the engineering department of the American Bridge Company until 1916, and then entered the engineering department of the Department of City Transit, Philadelphia, Pa. Mr. McGarrigle served as first lieutenant in the United States Army from July, 1917, until he went to the Midvale Steel & Ordnance Company, car department, general sales, Philadelphia, Pa., in 1919, and when it was merged with the Bethlehem Steel Company, he remained in the same department until the time of his joining the Clark Car Company on November 1, 1924.

Robert J. McKay, vice-president of the Pickett Coal & Coke Company, Chicago, has been appointed vice-president of **A. O. Norton, Inc.,** Boston, Mass., with headquarters in Chicago. **E. W. Hanegan,** of the car department of the Chicago Great Western, Oelwein, Iowa, has resigned to become special representative of A. O. Norton, Inc., with headquarters in Chicago. **O. L. Wright,** representative of Philip S. Justice & Co., also has been appointed representative of A. O. Norton, Inc., with headquarters at 421 Chestnut street, Philadelphia, Pa. **Lorenzo Norvell,** railroad representative of Fairbanks, Morse & Co., has resigned to become representative of A. O. Norton, Inc., with headquarters in the newly opened office in the Century building, St. Louis, Mo. **J. W. Cain and Co.** have been appointed representatives of A. O. Norton, Inc., with office in the Second National Bank building, Houston, Texas.

Trade Publications

No. 2 Steam Shovel.—The McMyler Interstate Company, Cleveland, Ohio, has issued a 24-page catalog illustrating and describing its No. 2 steam shovel. Photographs and wash drawings illustrate the various parts and aid in demonstrating the advantages of their salient features. Particular effort has been made to give the reader the information which he is anxious to have in studying equipment of this type, including tables and diagrams of clearances, dimensions, etc.

Water Filters.—An 8-page bulletin No. 501 has been issued by the Graver Corporation, East Chicago, Ind., devoted to filter equipment for purifying water. This bulletin develops the theory and advantages of filtration and describes in detail, with the aid of photographs, the Graver system, and contains a catalog of various filter accessory equipment, including an automatic feeding system for coagulants and detailed tables of dimensions and capacities of the filters.

Roof Standards.—The Federal Cement Tile Company, Chicago, has recently issued a 32-page, illustrated, 8½-in. by 11-in. booklet on roof standards as applied to this company's products. The text includes standard specifications for interlocking and glass tile and for flat and channel slabs. This is followed by 26 pages of detailed working drawings in the form of reproduced blueprints illustrating the application of pre-cast reinforced concrete slabs to all types of roof construction.

Safety Suggestion.—Templeton, Kenly & Company, Ltd., has issued a leaflet suggesting a change in double acting jacks which will eliminate the possibility of an accidental tripping of the jack. Attention is called to the fact that with the trip supported on a lug at the end of the lever rocket it is sometimes thrown into an operative position by the movement of the lever. This can be avoided by cutting off the lug so that the trip hangs down out of the way. This lug has been eliminated on all new Simplex jacks.

Track Equipment.—Two bulletins have been issued by the Louisville Frog & Switch Company, one devoted to a description of the Lawrence bumping post, particularly with reference to the service rendered in the Kentucky & Indiana Terminal Company at Louisville, Ky., while the other is devoted to a description of the "AMSCO" manganese crossing. These bulletins contain both descriptive information concerning this equipment and illustrations showing the equipment in detail and in service.

Coal and Ash Handling Plant.—The Ogle Construction Company, Chicago, has issued a four-page folder illustrating and describing a new coal and ash handling plant of simple design and moderate cost, which is intended for use where one track is used by locomotives in dumping cinders and receiving coal while a parallel track is used by coal cars for unloading coal into a track hopper and then receiving cinders from the locomotive cinder pit. The equipment for handling the coal and cinders is practically identical, consisting of two towers erected in the space between the two tracks, one being connected with the track hopper and the other the cinder pit.

Fairmont Motor Cars.—In a 12-page bulletin issued by the Fairmont Railway Motors, Inc., Fairmont, Minn., brief descriptions are given of the N-2 section gang car and the NC-2 heavy duty car, which comprise the latest developments of equipment manufactured by this company. Both the cars are designed for heavy service, the NC-2 being a modification of the N-2 in that it is equipped with a two-speed transmission in order to afford a speed sufficiently low to obtain the maximum effectiveness in hauling service. The bulletin is abundantly illustrated with photographs showing the various applications of this equipment, as well as various detail features to which the manufacturers desire to call particular attention.

Specifications for Roofing.—The Barrett Company, New York, has recently published the first issues of a set of five booklets which is entitled Architects and Engineers Built-Up Roofing Reference Series. Volumes 1 and 2, which have just been issued, are attractive, large-sized, 36 and 20-page booklets respectively, and cover flat roof and steep roof specifications. Each volume is illustrated with full page reproductions of blueprints, giving the details of built-up roofing, the text giving complete specifications for three, four and five-ply roofing laid on board tile, and poured and precast concrete and gypsum decks. The remaining booklets to be issued cover roof flashing, roof drainage, damp-proofing and water-proofing.

Freight Car Loadings for the week ending May 9 totaled 981,370 cars, an increase of 73,167 cars as compared with the same week last year and of 6,629 cars compared with 1923.

The Class I Railroads will spend approximately $750,000,000 this year for capital improvements, according to a report prepared by the Bureau of Railway Economics. Of this amount about $410,000 represents the expenditures to be made this year from authorizations not completed last year, while authorizations made during the first three months of 1925 have been sufficient to bring the total including the carryover, to $662,000,000. Of this amount $157,469,000 was actually expended during the first quarter of the present year.

The Travel Club of America, which has been organized by F. C. Carley, is offering to railways a travel club plan under which patrons may purchase round trip tourist tickets on partial payments. The arrangements with the roads are made on a royalty basis, half of which amount is to be used for advertising. At the present time this plan is in use on the Birmingham & Northwestern, the Chicago, Duluth & Georgian Bay Transit Company, the Goodrich Transit Company, the Gulf, Mobile & Northern, the Illinois Central, the Yazoo & Mississippi Valley, the Gulf & Ship Island, the Chicago & Eastern Illinois and the Michigan Transit Company. Arrangements provide for the issuance of travel club certicates and the purchase of stamps each week to cover the value of round trip tourist tickets. On the completion of payments, but not before the expiration of 32, 25 or 20 weeks from the date on which the travel club certificate was issued, a round-trip tourist ticket will be issued to the holder of the certificate on its surrender.

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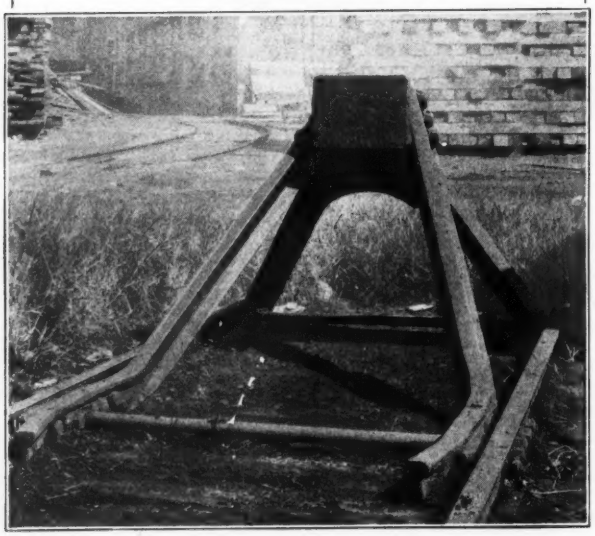

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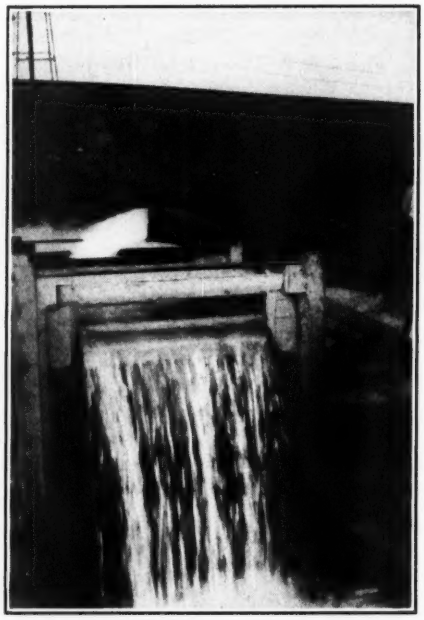

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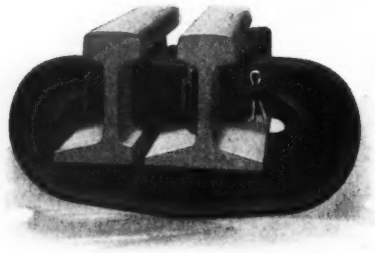

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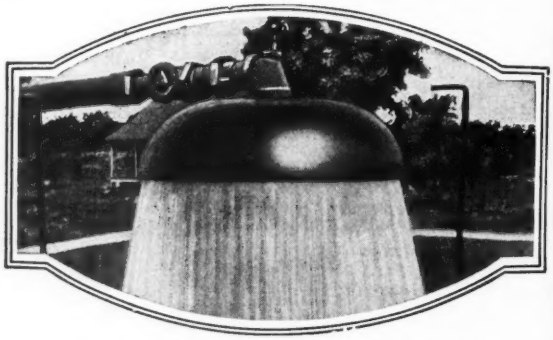

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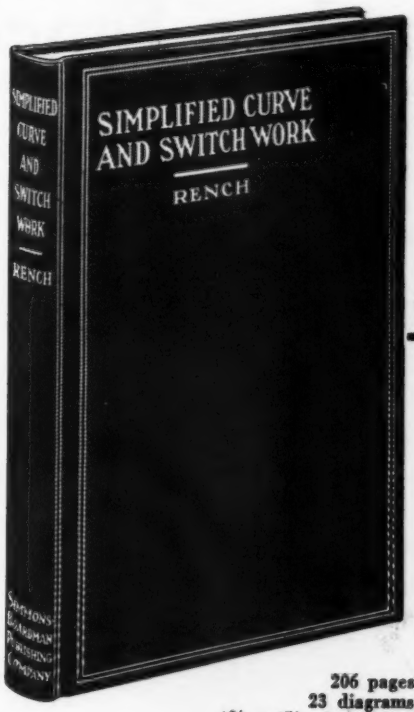

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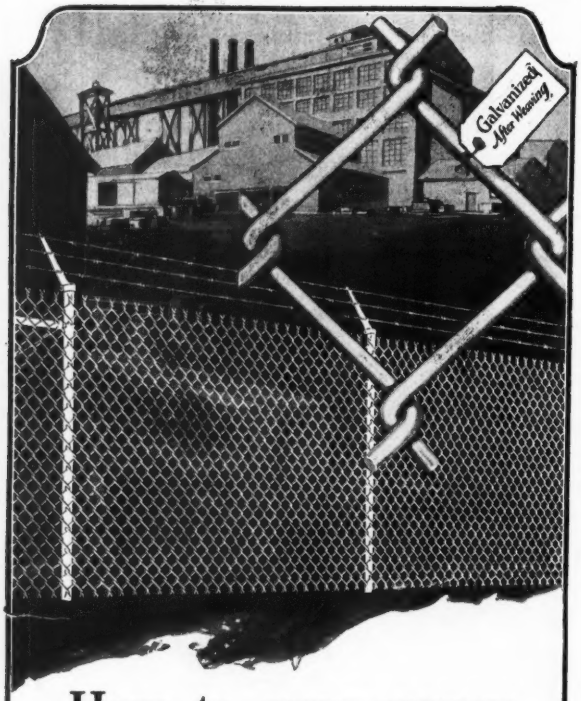

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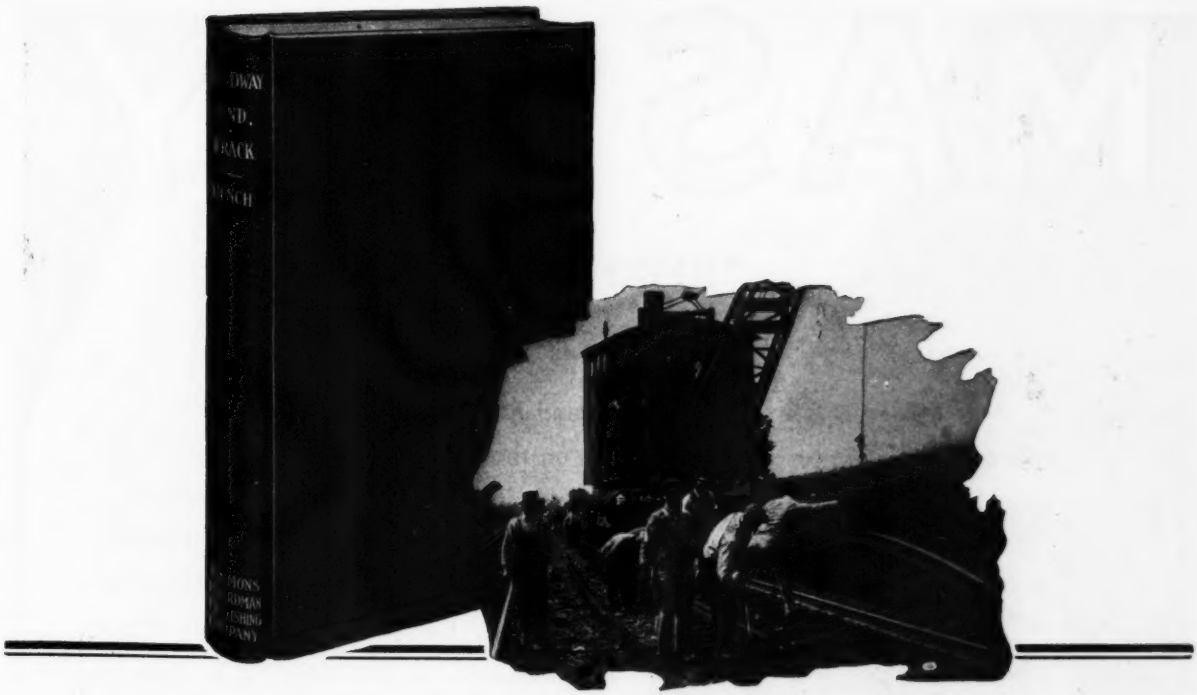

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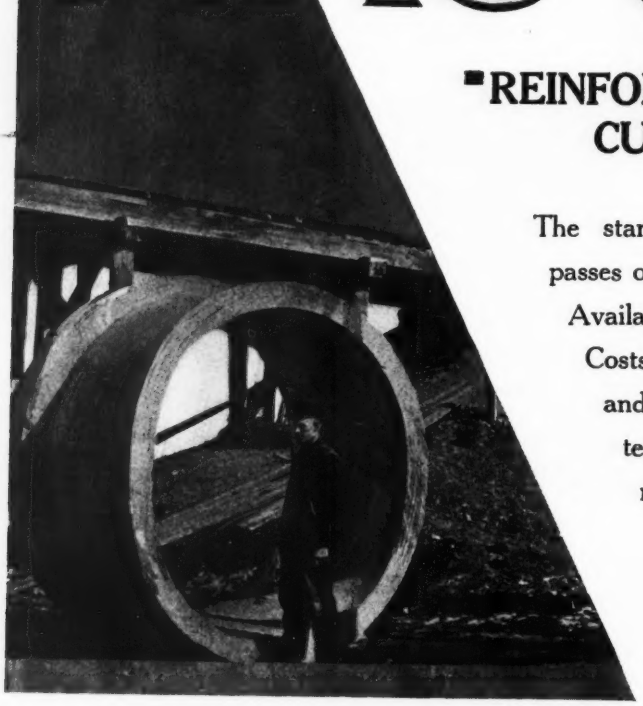

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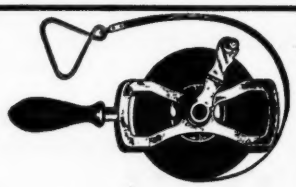

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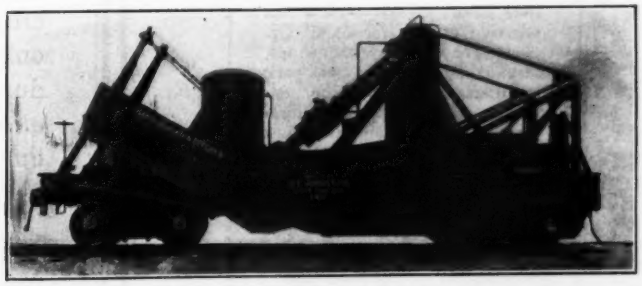

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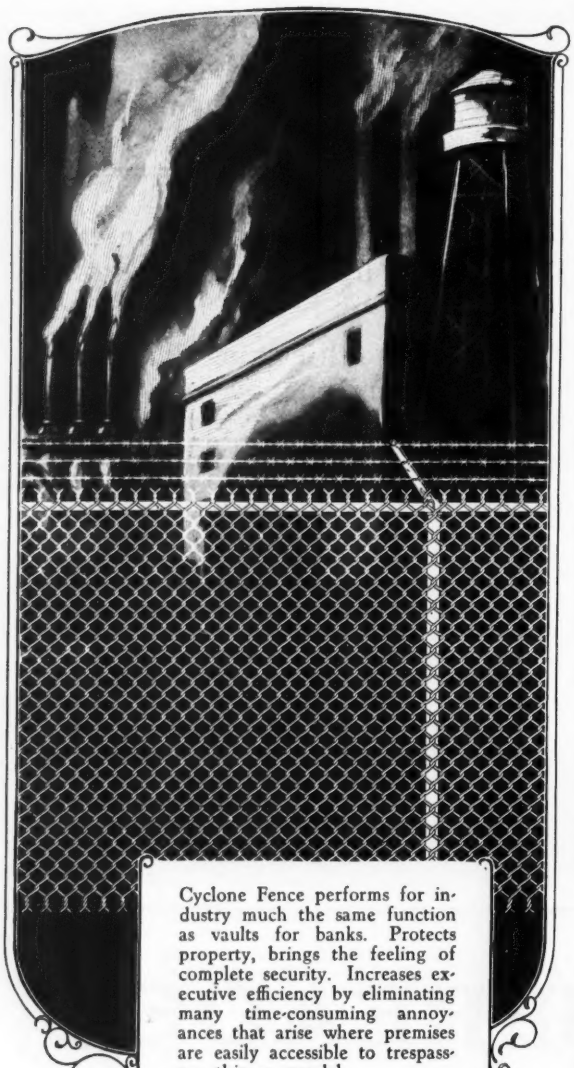

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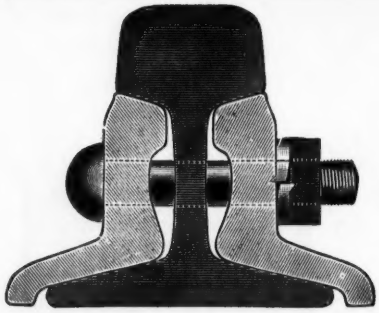

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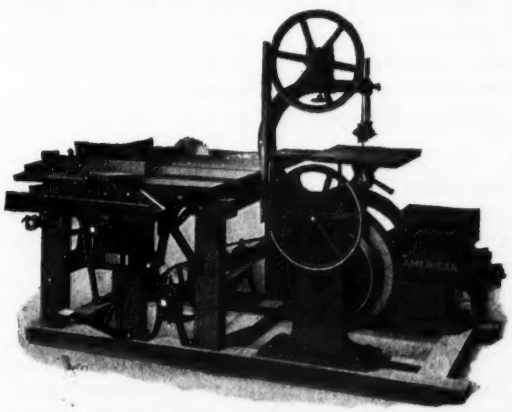

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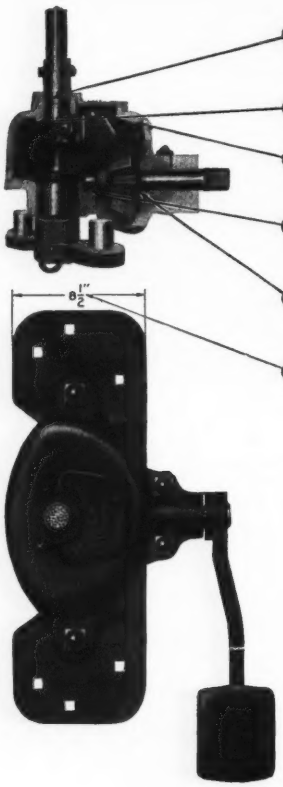
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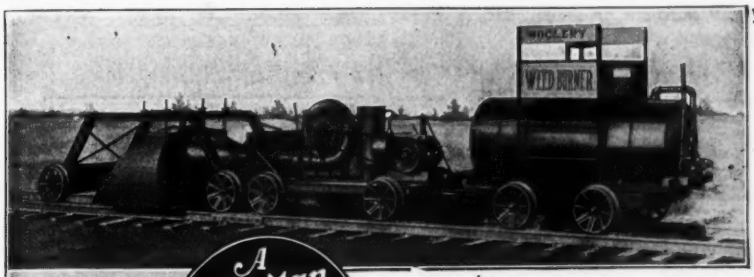

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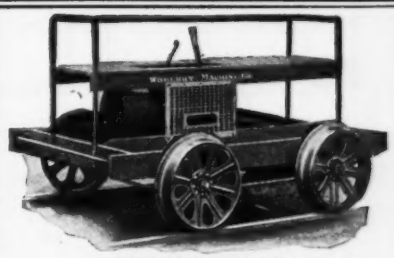

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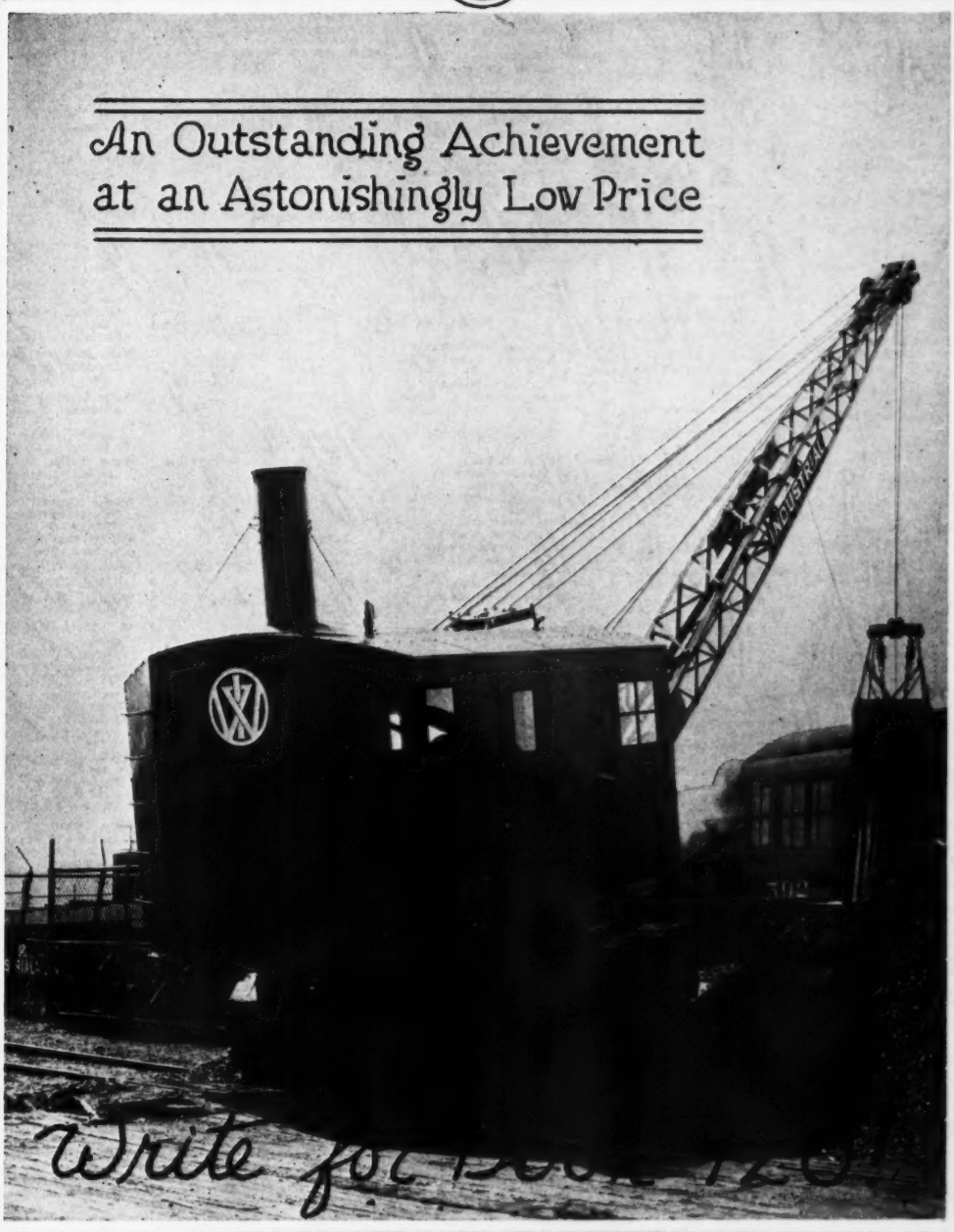

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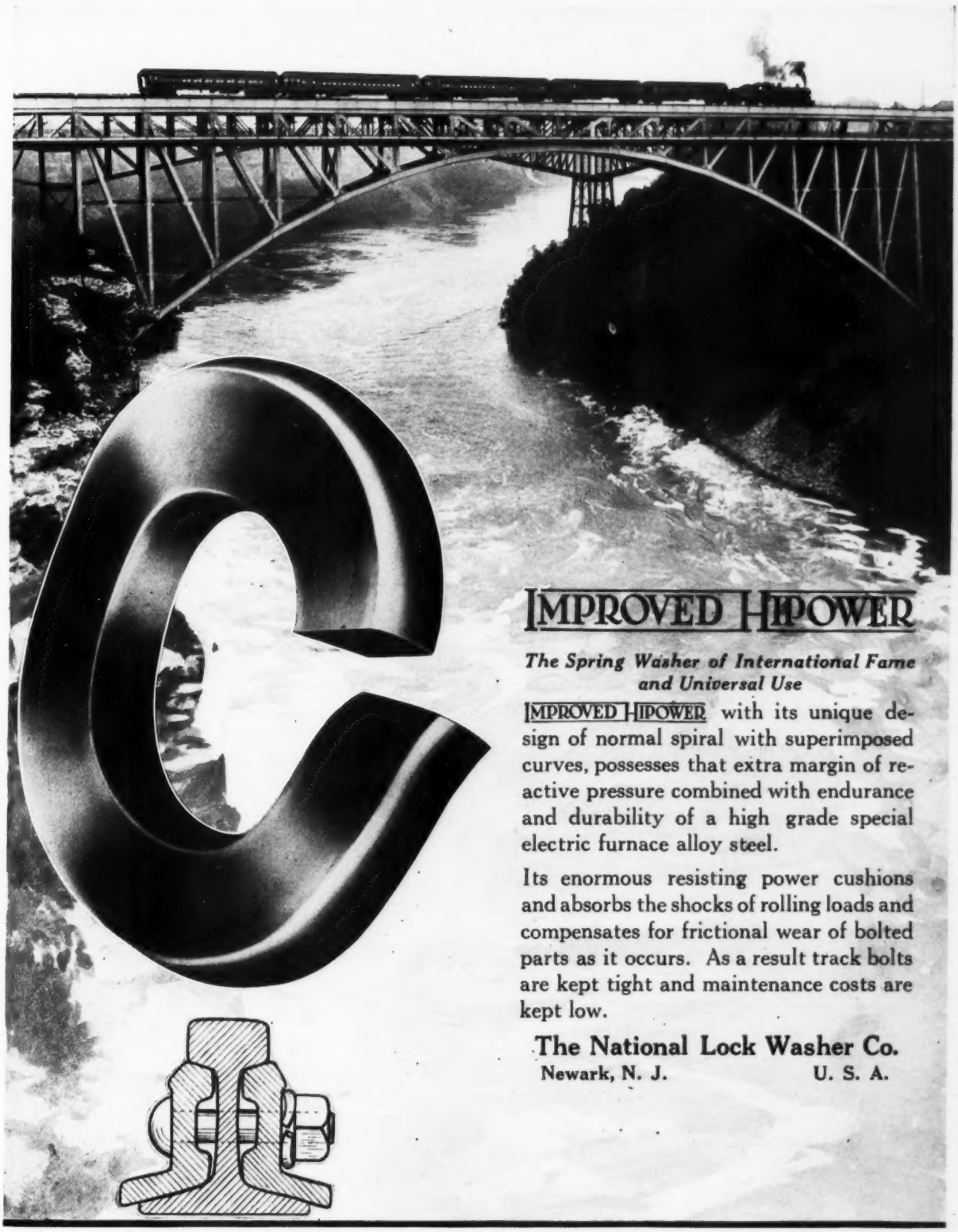


IMPROVED HIPOWER

The Spring Washer of International Fame and Universal Use

IMPROVED HIPOWER with its unique design of normal spiral with superimposed curves, possesses that extra margin of reactive pressure combined with endurance and durability of a high grade special electric furnace alloy steel.

Its enormous resisting power cushions and absorbs the shocks of rolling loads and compensates for frictional wear of bolted parts as it occurs. As a result track bolts are kept tight and maintenance costs are kept low.

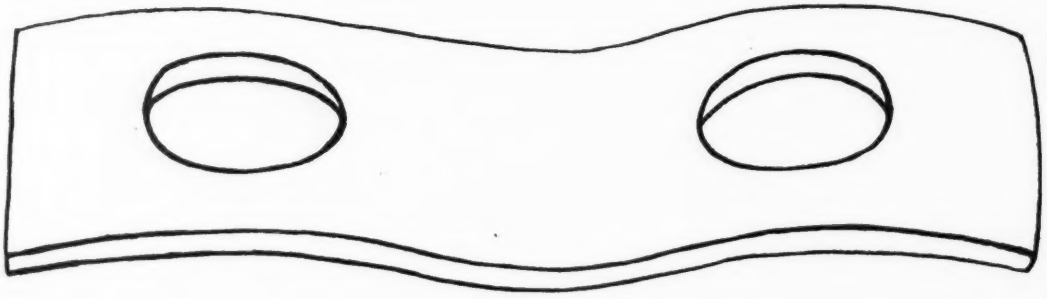
The National Lock Washer Co.
Newark, N. J. U. S. A.

IMPROVED HIPOWER

Use a Nail to Measure Pressure

WITH Verona Rail Joint Springs you can get any desired reactive pressure on your track bolts. An ordinary wire nail can be used as a pressure gauge by inserting it between the web of the rail and the crown of the spring, and drawing up the nuts until the nail just fits. The smaller the diameter of the nail the greater the pressure. The desired pressure can be obtained in this manner within fifteen per cent of accuracy.

The Verona Rail Joint Spring is the only device that will thus give you a uniform pressure. In the event of bolt stretch, rust or wear, the spring will take up the resultant slack and the pressure will be somewhat diminished, but the original pressure can always be accurately restored by tightening the nuts to the diameter of the standardized nail. We will be glad to specify nail diameters for any desired pressure to railroads using Verona Rail Joint Springs.

VERONA TOOL WORKS

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